CHAPTER III
METHODOLOGY

This part discusses the methodology of the research. It consists of research design, research instrument, subject of the research, data and data source, technique of data collection and technique of data analysis.

3.1. Research Design

This study employed a sequential explanatory mixed-methods design, which integrates quantitative and qualitative approaches in two consecutive phases (J. W. Creswell & Plano Clark, 2018). The quantitative phase was conducted first using a short survey to measure students' AI dependency and tendencies toward independent learning. The qualitative phase followed, using descriptive qualitative inquiry through semi-structured interviews to further explain, elaborate, and contextualize quantitative trends.

This design was chosen because sequential explanatory procedures allow the qualitative findings to clarify initial numerical results, providing deeper insight into how learners interpret AI-supported learning experiences (Ivankova et al., 2006). The integration of both datasets offers a comprehensive understanding of the relationship between AI dependency and independent learning among EFL university students.

3.2. Research Setting

The study will be conducted at the University of Muhammadiyah Gresik, East Java, Indonesia. The institutional context provides a relevant environment for investigating AI use in English language learning, as the English Education program integrates technology-enhanced language learning into its curriculum. The research setting allows the study to explore real academic practices in which students regularly interact with AI-based tools to support their English learning processes.

3.3. Population, Sample and Technique of Sampling

The population of this study consists of undergraduate students majoring in English Education at the University of Muhammadiyah Gresik. This population is appropriate because these students are directly engaged in English learning and possess both linguistic and pedagogical awareness needed to offer relevant perspectives on the integration of AI tools in academic activities. The general age range of this population is between 18 and 25 years, reflecting typical characteristics of tertiary-level learners (Fraenkel, 2012).

The sample of this study includes two groups of participants, aligned with the sequential explanatory mixed-methods design. First, 30 students were selected to participate in the quantitative questionnaire phase. Their involvement aimed to capture general tendencies in AI usage and perceptions, with the intention of generating descriptive insights rather than broad statistical generalization (J. W. ; C. J. D. Creswell, 2018). Second, five students were selected for the qualitative semi-structured interviews. These students were chosen because they were able to provide deeper, information-rich explanations that complement and clarify the quantitative results. All participants included in both phases were required to have regular experience using AI tools such as ChatGPT, Grammarly, or similar applications in their academic work.

This study employed multiple sampling strategies across its two research phases. In the quantitative phase, purposive sampling was applied to ensure that participants met specific criteria relevant to the research objectives, namely active engagement with AI-based learning tools. Purposive sampling is particularly appropriate when researchers deliberately select information-rich participants who possess relevant experience and characteristics aligned with the focus of the study (J. W. Creswell & Plano Clark, 2018; Patton, 2015)). In the qualitative phase, snowball sampling was utilized to identify participants capable of providing deeper and more nuanced insights. Initial respondents from the quantitative phase recommended other students who met the inclusion criteria. Snowball sampling is widely recognized as an effective technique for accessing information-rich cases through participant networks, especially when the study seeks in-depth perspectives

on specific phenomena (Biernacki & Waldorf, 1981; J. W. Creswell, 2013). This approach strengthened the qualitative inquiry by ensuring the inclusion of participants who could meaningfully articulate their perceptions of AI use in learning contexts.

3.4. Research Instrument

This study employed two primary data collection instruments: a structured questionnaire and a semi-structured interview guide. These instruments were intentionally selected to align with the sequential explanatory mixed-methods design, allowing the quantitative phase to identify general patterns and the qualitative phase to provide deeper explanation and contextualization (J. W. Creswell & Plano Clark, 2018; Merriam, 2016).

The quantitative component used a 23-item Likert-scale questionnaire designed to measure students' frequency of AI use, perceived usefulness, levels of dependency, and their self-regulated learning tendencies. Each item was rated on a five-point scale ranging from Strongly Disagree to Strongly Agree. The questionnaire was concise to ensure accessibility and reduce respondent fatigue while still capturing essential constructs related to AI-supported learning behaviors.

Furthermore, the questionnaire items were adapted from prior technology acceptance and learning autonomy frameworks, including constructs such as perceived benefits, ease of use, learning support, potential risks, and ethical considerations. The purpose of this instrument was to obtain preliminary descriptive trends regarding students' engagement with AI tools, the roles these tools play in their English learning, and the degree to which students perceived themselves as dependent or independent in their learning processes. Given the descriptive orientation, the instrument functioned as an efficient means of identifying broad tendencies across the participant group (Fraenkel, 2012).

To complement the questionnaire and thereby provide deeper explanatory insight, the study employed a semi-structured interview guide consisting of open-ended prompts that explored four major domains. First, the interviews investigated students' AI usage patterns, including the types of tools used, frequency, and

purposes. Second, they examined perceived benefits such as support for language learning, improvements in writing quality, enhanced motivation, and increased task efficiency. Third, the guide addressed challenges and dependency issues, particularly overreliance, reduced critical thinking, accuracy concerns, and misunderstandings of AI-generated content. Finally, the interviews covered ethical considerations involving academic integrity, originality, plagiarism risks, and responsible use. Semi-structured interviews were selected because they offer the flexibility needed to probe participants' experiences while maintaining a consistent thematic structure, thus enabling respondents to articulate their attitudes, behaviors, and concerns in their own words and producing rich narratives that help clarify and contextualize the questionnaire findings (Merriam, 2016). Moreover, through follow-up questions, the interviewer was able to resolve ambiguities, explore unexpected insights, and capture nuanced perceptions that quantitative measures alone cannot adequately represent.

Together, these two instruments ensured methodological complementarity: the questionnaire offered breadth by capturing patterns across a group of students, while the semi-structured interviews provided depth by uncovering nuanced explanations behind those patterns. This integration strengthened the interpretive validity of the study by allowing quantitative findings to be expanded, clarified, and enriched through qualitative evidence

3.5. Research Procedure

1. Develop instruments: Create 10-item Likert-scale questionnaire (adapted from AI dependency and independent learning frameworks) and semi-structured interview guide covering AI usage patterns, benefits, challenges, and ethical concerns.
2. Validate and pilot: Conduct expert judgment for content validity and pilot test with 5 non-sample students to ensure clarity, reliability (target Cronbach's Alpha >0.80).

3. Distribute questionnaire: Administer to 30 purposively selected English Education students at Universitas Muhammadiyah Gresik via Google Forms for quantitative data on AI dependency levels.
4. Select interviewees: Choose 5 participants via snowball sampling based on extreme/high dependency scores from questionnaire results.
5. Conduct interviews: Hold 30-45 minutes semi-structured Zoom/in-person sessions, audio-record, and transcribe verbatim.
6. Analyze quantitative data: Compute descriptive statistics (means, frequencies, percentages) and correlation between AI dependency and independent learning using SPSS.
7. Analyze qualitative data: Perform thematic analysis (open coding → axial coding → theme development) using Braun's (2006) approach.
8. Integrate findings: Merge quant results with qual themes via joint display/matrix to explain perceptions and dependency patterns.Conduct semi-structured interviews with selected students to obtain explanatory insights.

3.6. Technique of Data Collection

The data for this study will be collected through a series of systematic procedures to ensure the credibility and depth of the findings.

1. The researcher will inform the department, obtain formal permission to conduct the study, and provide all prospective participants with a study briefing explaining the purpose, procedures, potential risks, benefits, confidentiality, and their rights as participants. At this stage, students will also be asked to read and sign an informed consent form to ensure voluntary participation.
2. Questionnaires will be distributed to 30 purposively selected undergraduate English Education students who have formally agreed to participate by signing the informed consent form. These questionnaires will collect quantitative data on students' AI dependence and its influence on their independent learning.

3. Completed questionnaires will be collected, checked for completeness, and tabulated for descriptive quantitative analysis while ensuring that all data are anonymized and stored securely.
4. Semi-structured interviews will be conducted with five students selected through snowball sampling. Before the interviews take place, participants will again be reminded of their rights, asked for verbal confirmation of consent, and permitted to withdraw if desired. All interview responses will be audio-recorded with participants' permission, then transcribed and anonymized to maintain confidentiality and ethical compliance.

3.7. Technique of Data Analysis

1. The data in this study will be analyzed using a combination of quantitative descriptive analysis and qualitative thematic analysis to provide a comprehensive interpretation aligned with the research questions.
2. The questionnaire data obtained from the participants will be processed using descriptive statistics to identify general trends and patterns related to students' AI dependency and their tendencies toward independent learning. Simple visual representations such as frequency tables and percentage distributions will also be generated to enhance clarity.
3. The qualitative data derived from semi-structured interviews will be transcribed and analyzed using thematic analysis following Braun (2006) procedural steps: familiarization, generating initial codes, categorization, constructing themes, and interpreting the findings. The analysis will focus on identifying recurring perceptions regarding the benefits, challenges, and potential risks of AI use, particularly its influence on students' confidence, autonomy, and decision-making in learning. Prior to data collection, all participants will receive and sign informed consent forms ensuring voluntary participation and ethical compliance.
4. The researcher will conduct data matching and cross-checking between the quantitative results and qualitative themes to identify convergent and divergent patterns. This integrated analytic approach will strengthen the interpretation of findings and provide a holistic understanding of how AI

dependency shapes students' independent learning in English language education.

3.8. Data Validation

Quantitative validity and reliability procedures were conducted to ensure the accuracy and consistency of the instrument prior to analysis. Content validity was established through expert judgment by two specialists in English Education, who evaluated the relevance, clarity, and alignment of the 23 questionnaire items with the constructs of AI dependency and independent learning. Their assessment confirmed that all indicators adequately represented the underlying theoretical concepts and met the criteria for content appropriateness. Instrument reliability was examined using Cronbach's Alpha, yielding a coefficient of 0.980, which falls into the category of very high reliability and demonstrates strong internal consistency across items. Accordingly, the quantitative instrument was deemed valid, reliable, and suitable for further analysis.

For the qualitative phase, validation followed Braun's (2006) approach to thematic analysis, emphasizing transparency and methodological coherence. Credibility was strengthened through member checking, allowing participants to review and confirm the accuracy of the researchers' preliminary interpretations. Dependability was supported by maintaining structured documentation of analytic procedures, including coding steps and theme development. Integration in the mixed-methods phase was achieved through comparing points of convergence and divergence between quantitative patterns and qualitative themes. Convergent findings reinforced the robustness of interpretations, whereas divergent findings were examined further to identify contextual explanations. This integrative validation strengthened the overall interpretation of students' AI dependency and independent learning tendencies within the study.