



RESEARCH ARTICLE

The Influence of Artificial Intelligence Use on Critical Thinking Skills of Geography Education Students at University of Lampung

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ABSTRACT

The development of Artificial Intelligence (AI) technology has provided convenience in various fields, including education. However, behind the efficiency offered, there are concerns about its potential negative impact on students' critical thinking skills. This study aims to analyze the effect of AI use on the critical thinking skills of students in the Geography Education Study Program, University of Lampung. The research method used was quantitative with a descriptive analytical approach. The study sample consisted of 61 students selected using cluster sampling techniques. Data were collected through questionnaires and analyzed using a simple linear regression test. The results of the study show that Geography Education students at the University of Lampung actively utilize AI platforms, especially ChatGPT (78.4%), in completing academic assignments and searching for references. Although there are differences in average critical thinking ability scores based on gender, students generally demonstrate good critical thinking skills, reflected in the high application of analysis, explanation, and inference indicators, so that AI is actively and reflectively utilized as a learning tool. The results of the analysis test indicate a significant negative influence between the use of AI on critical thinking skills. This is indicated by the coefficient of determination (R Square) value of 0.110 (11%), which indicates that the higher the intensity of AI use, the more likely it is that students' critical thinking skills will decline. However, the majority of respondents still demonstrated good abilities in the three main indicators of critical thinking: analysis, explanation, and inference. Based on the research results, it was concluded that the use of AI must be balanced with increased digital literacy and the habit of verifying information to maintain and develop students' critical thinking skills.

Keywords: Artificial Intelligence; Critical Thinking; University Students



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1. INTRODUCTION

The rapid development of technology, especially in the field of education, is currently making extensive use of technology, particularly artificial intelligence (AI). One technology believed to have excellent potential in the future of education is artificial intelligence technology. According to Mayang Pi (2022), Artificial Intelligence is a knowledge that allows computers to imitate human intelligence, such as performing inferential analysis in drawing conclusions to make decisions about whether to translate one

language into another (Saputra et al., 2023). The presence of this technology has changed the way students access information, understand learning materials, and complete academic assignments.

One of the most widely used forms of AI in education is chatbots, specifically ChatGPT (Generative Pre-trained Transformer). This GPT-based technology is capable of understanding and responding to text commands in a conversational style similar to humans (Setiawan & Luthfiyani, 2023). ChatGPT is considered to have the ability to present information quickly and efficiently, and is capable of providing assistance. ChatGPT's ability to provide needed information is also more efficient than that of humans in general, and its writing ability is above average for students (Setiawan & Luthfiyani, 2023). Artificial intelligence related to implementation in education is a system designed to support the education and learning process (Nadila & Septiaji, 2023), which allows students to obtain information, compose writing, and even complete academic assignments quickly (Kannangara, 2024). This is supported by research conducted by Firdaus et al. in 2025. The results of this study showed that AI helps students understand material, find additional learning resources, and can increase learning efficiency (Firdaus et al., 2025). According to Purbowati (2023), AI (Artificial Intelligence) utilizes machine learning algorithms and data analysis to identify individual student needs. Artificial Intelligence will then provide materials tailored to each student's level of understanding and learning style (Saputra et al., 2023). With the advent of AI, learning content tailored to the digital context can be generated. According to Dr. Johnson (2019), an expert in educational technology, "AI has the ability to transform the teaching process, making it more accessible and efficient for learning in all contexts." The role of artificial intelligence technology in making the learning process more active is evident. (Liriwati, 2023).

The use of technology in this era has brought significant changes to the world of education with the emergence of the concept of educational transformation 5.0. This concept involves the use of AI, the Internet of Things, big data, and other technologies, where the use of artificial intelligence has changed the way humans interact and work (Rochim, 2024). Students today not only learn using textbooks, but also utilize various technologies such as e-learning, learning videos, and artificial intelligence (AI) to help understand the material and complete assignments in lectures (Ali Akbar et al., 2023). Although AI offers efficiency and supports independent learning, serious concerns have arisen regarding its potential impact on essential 21st-century skills. The learning process becomes more active, which is the role of artificial intelligence technology. (Liriwati, 2023). Mastery of 21st-century skills encompasses the 4Cs, with critical thinking as one of the key skills required to complete tasks that humans are supposed to perform. (Cynthia & Sihotang, 2023). Critical thinking skills play a vital role in helping students analyze information, evaluate the validity of sources, distinguish between facts and opinions, and make logical and responsible decisions (Susanto & Azizah, 2025).

To face the increasingly rapid technological developments, students must strengthen their thinking skills. Thinking skills are defined as a person's ability to process information, analyze, evaluate, and make decisions based on the information received in a logical and rational manner (Armansyah et al., 2022). Thinking is the process of seeking and discovering knowledge through interactions between individuals and the environment. Amelia et al. (2024) emphasized that learning to think in the educational process, especially in higher education, does not only emphasize the accumulation of knowledge of course material, but what is prioritized is the ability of students to acquire their own knowledge (self-regulated) (Amalia et al., 2024). In the context of learning, critical thinking skills are one of the most important things to help students solve problems, make decisions, and think back independently (Galindo-Domínguez et al., 2023). Critical thinking skills are a key skill that students must have, especially geography education students who are required to analyze spatial data and solve spatial problems. Sudarsih et al. (2022), based on research results, critical thinking skills are thinking skills that students must have to be able to solve life problems by identifying all the information they receive, evaluating and conveying it systematically and being able to express opinions in an organized manner. (Sudiasih et al., 2022). This ability is absolutely necessary for everyone to be able to solve problems and make decisions about problems faced in real life.

Based on previous research conducted by (Putri & Panduwinata, 2025) entitled "The Effect of Artificial Intelligence Use on Students' Critical Thinking" (2025). The results of the study indicate that the use of Artificial Intelligence (AI) has a positive and significant effect on students' critical thinking skills. It is explained that AI can help students access information quickly, support personalized learning, and facilitate the analysis and evaluation of academic assignments. However, the use of AI still needs to be controlled so as not to create dependency that can reduce students' independent thinking. Therefore, the application of AI in education needs to be done in a balanced manner as a learning tool that supports, not replaces, students' critical thinking processes.

Based on previous research, researchers observed the rapid development of technology almost throughout the world, of course Indonesia cannot be separated from this technological development. The use of AI is currently very widespread, especially among students. Based on preliminary research that researchers have conducted on May 7, 2025, the results obtained that most of the Geography Education students of Unila Class of 2023 & 2024 know and use AI. Data generated from the preliminary research shows that Chat GPT is still the AI most frequently used by Geography Education students of Unila Class of 2023 & 2024. The increasing development of AI, based on the results of preliminary research conducted by researchers on Geography Education students of the University of Lampung Class of 2023 and 2024 on May 7, 2025, it was identified that the use of artificial intelligence (AI) is increasingly being utilized by students in completing academic assignments, searching for references and information. The presence of AI has been proven to contribute to the learning efficiency of Geography Education students, allowing them to study independently without relying on lecturers' explanations during class. In addition, AI also has the ability to recommend learning resources that are appropriate to the level of difficulty faced by students. Technological advancements have brought significant changes to all fields, especially education. Indulging in the conveniences available, many students neglect the critical thinking skills they need to process information, especially from the internet. This indicates a decline in critical thinking skills among students.

Based on the above background, There are three formulations of the problem to be answered, namely; (1) What are the Characteristics of the Use of AI (Artificial Intelligence) in Geography Education Students at the University of Lampung, (2) What are the Characteristics of Critical Thinking Skills in Geography Education Students at the University of Lampung, and (3) How is the Influence of the Use of AI (Artificial Intelligence) on the Critical Thinking Skills of Geography Education Students at the University of Lampung. This study has the aim or answer to the formulation of the problem, namely knowing the characteristics of the Influence of the Use of AI (Artificial Intelligence) on the Critical Thinking Skills of Geography Education Students at the University of Lampung, knowing the characteristics of Critical Thinking Skills in Geography Education Students at the University of Lampung, and knowing and understanding the Influence of the Use of AI (Artificial Intelligence) on the Critical Thinking Skills of Geography Education Students at the University of Lampung.

2. LITERATURE REVIEW

This section presents the theoretical foundations and key concepts underlying the study. The discussion covers three main areas: (1) Artificial Intelligence in education, (2) critical thinking skills, and (3) the relationship between AI use and critical thinking in higher education contexts. These theoretical frameworks provide the conceptual basis for understanding the research problem and interpreting the findings of the study.

2.1 Artificial Intelligence in Education

Artificial Intelligence (AI) refers to computer systems designed to perform tasks that typically require human intelligence, such as reasoning, learning, and problem-solving (Saputra et al., 2023). In the context of education, AI is broadly defined as a system designed to support the education and learning process

(Nadila & Septiaji, 2023). The integration of AI into educational settings has accelerated significantly over the past decade, driven by the availability of powerful AI tools such as ChatGPT, which are capable of generating text, answering questions, and assisting with academic assignments in a conversational manner.

According to Liriwati (2023), the curriculum transformation driven by AI has created opportunities for more personalized and adaptive learning experiences. AI systems can identify individual student needs and provide materials tailored to their level of understanding and learning style (Saputra et al., 2023). This adaptability represents one of AI's greatest potential contributions to education. Research by Firdaus et al. (2025) confirmed that AI helps students understand material, find additional learning resources, and increase learning efficiency. Similarly, Ali Akbar et al. (2023) noted that students today utilize various technologies including AI to help understand material and complete academic tasks.

However, the rapid adoption of AI tools in academic settings has also raised concerns about over-reliance and misuse. When students use AI passively to generate answers without critical evaluation, the learning process is undermined. Rochim (2024) emphasized that the advancement of AI in the era of Education 5.0 demands that students not merely consume AI-generated content, but engage with it critically and responsibly. The ethics of using generative AI, including principles of honesty, transparency, and prevention of plagiarism, have thus become important considerations in educational policy and practice.

2.2 Critical Thinking Skills

Critical thinking is widely recognized as one of the most essential competencies for students in the 21st century. It is broadly defined as a person's ability to process information, analyze, evaluate, and make decisions based on the information received in a logical and rational manner (Armansyah et al., 2022). Galindo-Domínguez et al. (2023) emphasized that critical thinking skills are key to helping students solve problems, make decisions, and think independently in learning contexts. In the geography education context specifically, critical thinking is essential for analyzing spatial data and understanding the relationship between humans and their environment.

Critical thinking is often operationalized through specific cognitive indicators. In this study, three main indicators were adopted: analysis, explanation, and inference. Analysis refers to the ability to distinguish facts from opinions, assess data accuracy, and evaluate relevance. Explanation involves providing clear, structured, and logical descriptions of concepts or phenomena. Inference is the ability to draw conclusions based on available evidence and to connect existing facts to produce logical and relevant understandings (Amalia et al., 2024). Together, these indicators provide a comprehensive framework for measuring the depth of students' critical thinking engagement.

Prior research has shown that critical thinking skills are influenced by multiple factors, including gender, learning environment, and educational experience (Rusyana & Rinaldi, 2023). Suryati et al. (2024) found that male students tend to have slightly higher critical thinking scores than female students in certain contexts, while other studies suggest that women think more reflectively and systematically. These findings indicate that critical thinking is a multidimensional construct shaped by complex interactions between individual characteristics and environmental factors, rather than being determined by a single variable.

2.3 The Relationship Between AI Use and Critical Thinking

The relationship between AI use and students' critical thinking skills is complex and contested in the literature. On one hand, AI tools have been shown to support learning by providing rapid access to information, facilitating independent study, and offering personalized feedback (Putri & Panduwinata, 2025). Nazila et al. (2025) found that ChatGPT use had a positive effect on students' critical thinking skills when used wisely and reflectively. These findings suggest that the manner in which AI is used, rather than AI use itself, is the critical determinant of its impact on thinking skills.

On the other hand, passive and unreflective use of AI has been associated with negative outcomes for higher-order thinking. Kannangara (2024) conducted a systematic review on the impact of generative

AI on critical thinking skills in undergraduates and found evidence of both positive and negative effects depending on usage patterns. Specifically, excessive reliance on AI-generated answers, without engaging in independent evaluation and synthesis, reduces students' opportunities to practice and develop analytical and inferential skills. Fiqtianisa & Purwanti (2025) further argued that digital literacy is a critical mediating factor: students with stronger digital literacy skills are better equipped to use AI as a learning tool rather than a substitute for thinking.

This tension between AI's potential to enhance learning and its risk of undermining critical thinking forms the central theoretical problem of this study. The research gap identified in the existing literature is the lack of empirical studies examining this relationship in the specific context of geography education students in Indonesia, particularly at the University of Lampung. This study addresses this gap by empirically testing the influence of AI use on critical thinking skills using a quantitative approach, contributing to a growing body of evidence on AI's educational impact in the Indonesian higher education context.

3. METHOD

This study uses a quantitative approach with a descriptive analytical method and a correlational study design, which aims to test the level of relationship and significance of the influence of the independent variable (Use of Artificial Intelligence or AI) on the dependent variable (Critical Thinking Skills). This research was conducted at the Geography Education Study Program, University of Lampung, which is precisely located at Jalan Prof. Dr. Ir. Sumantri Brojonegoro, Gedong Meneng, Rajabasa District, Bandar Lampung City, Lampung. This Geography Education study program has been established since 1968. To make it easier to understand the research location, the following is a map showing the administrative location where the research was carried out.

In the research process, the implementation time was divided into two, namely on May 7, 2025, preliminary research was conducted and on August 6, research was conducted. The population in this study were active students of the Geography Education Study Program, University of Lampung, Class of 2023 and 2024, with a sample measurement taken of 15% of the population calculated using the Taro Yamane formula, 61 samples were obtained using *cluster sampling techniques* to ensure group representation. The discussion of the instruments of this study is as table 1.

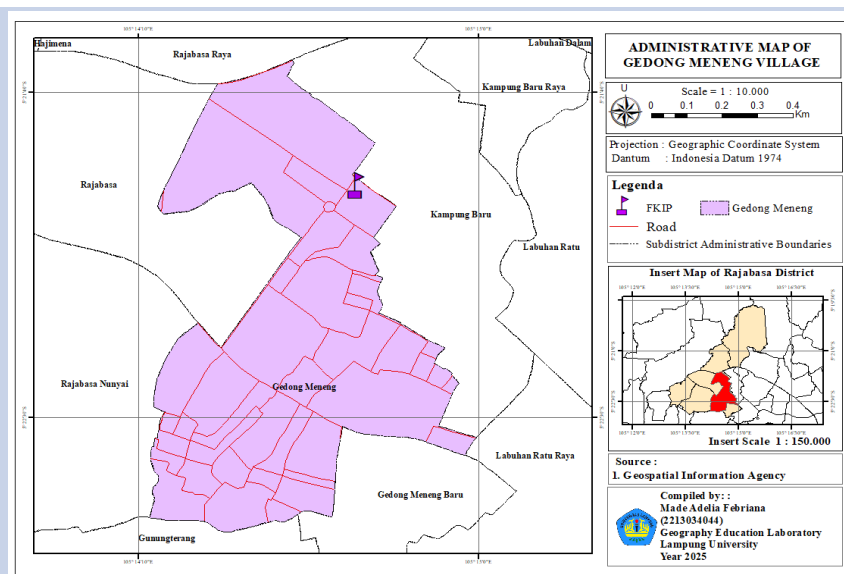


Figure 1. Map of Research Locations

Table 1. Indicators and Descriptions of Research Variables

| Use of Artificial Intelligence (Variable X) | |
|--|--|
| Effectiveness | Effectiveness in using AI refers to the level of success of AI technology in helping users achieve goals accurately, quickly, and optimally. |
| Efficiency | Efficiency in the use of AI is reflected in the ability of AI to achieve desired results with minimal use of resources such as time, energy, and cost while still producing optimal outputs. |
| Validity of Information | The validity of information in AI use refers to the level of accuracy, truthfulness, and reliability of the information produced, ensuring that it represents actual conditions or factual data. |
| Ethics of Using Generative AI | Ethics in using generative AI refer to the principles that guide responsible, safe, and ethical use of AI technology. These principles emphasize honesty, transparency, privacy protection, respect for copyright, and the prevention of misuse such as plagiarism, manipulation of information, or dissemination of misleading content. |
| Critical Thinking Ability (Variable Y) | |
| Analysis | Analysis refers to the user's ability to distinguish facts from opinions, evaluate the accuracy of data, and assess the relevance and reliability of information before using it as a basis for decision-making. |
| Explanation | Explanation refers to the user's ability to provide clear and structured descriptions when explaining a concept, event, or phenomenon so that it can be logically understood by readers or listeners. |
| Inference | Inference refers to the user's ability to draw conclusions based on available evidence, data, or information. In critical thinking, inference connects existing facts to produce logical understanding or assumptions, even if they are not explicitly stated. |

The main data in this study were collected through a questionnaire instrument that had gone through validity and reliability tests, which aimed to measure students' perception scores on the AI Use variable and Critical Thinking Ability scores (based on analysis, explanation, and inference indicators). Before conducting the hypothesis test, analysis prerequisite tests were carried out, namely the normality test, homogeneity test and linearity test assisted by SPSS Version 22. In this study, the main data analysis technique used was simple linear regression to test the significance of the influence and determine the coefficient of determination (R square), at a significance level (α) of 0.05.

4. RESULTS AND DISCUSSION

4.1 Respondent Characteristics

The Geography Education Study Program is an essential part of the Department of Social Sciences Education, Faculty of Teacher Training and Education (FKIP), University of Lampung. This Geography Education study program has been established since 1968. Based on quality evaluation, the Geography Education Study Program is recognized as one of the leading study programs and has achieved A accreditation at the University of Lampung.

In this study, researchers conducted research in the Geography Education Study Program. The respondent profile in this study illustrates the characteristics of participants who play a crucial role in providing data and information in accordance with the research objectives. To provide a clearer picture regarding the number of research respondents, the results can be presented in the form of a graph regarding the number of research respondents as follows.

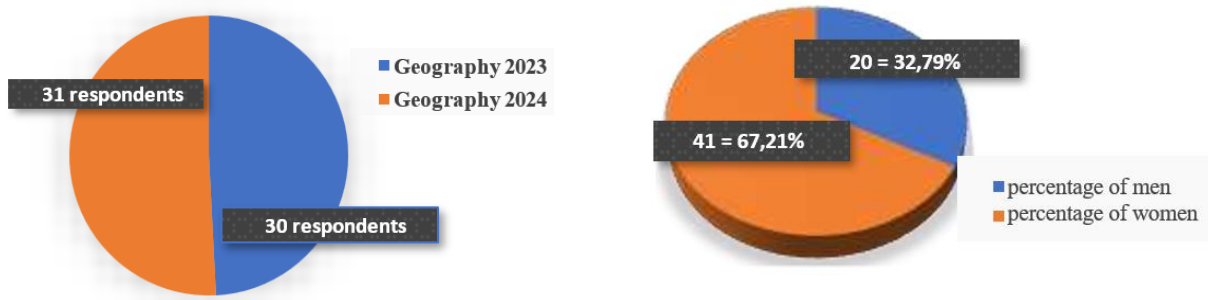


Figure 2. Research Respondent and Gender Comparison of Respondents

Based on Figure 2, the research respondents show that the number of research respondents was 61 students with a division of 30 respondents being active students of Geography Education Class of 2023, and 31 respondents being active students of Geography Education Class of 2024. Based on the number of respondents involved in this study, the analysis of respondent characteristics also considers demographic aspects, namely gender. To provide a clearer picture regarding the gender aspect of respondents, the results can be presented in the form of a graph regarding the comparison of the number of research respondents based on gender as follows. Based on Figure 3, the comparison of the gender of the research respondents shows that from the number of respondents who participated in the study, 41 respondents with a percentage of 67.21% were categorized as female, and 20 respondents with a percentage of 32.79% were categorized as male. In addition to paying attention to the demographic aspects of the gender of the respondents, the researchers also analyzed the characteristics of the respondents by considering the demographic aspects of the respondents' residence locations. To provide a clearer picture regarding the aspects of respondents' residences, the results can be presented in the form of a respondent distribution map, as follows.

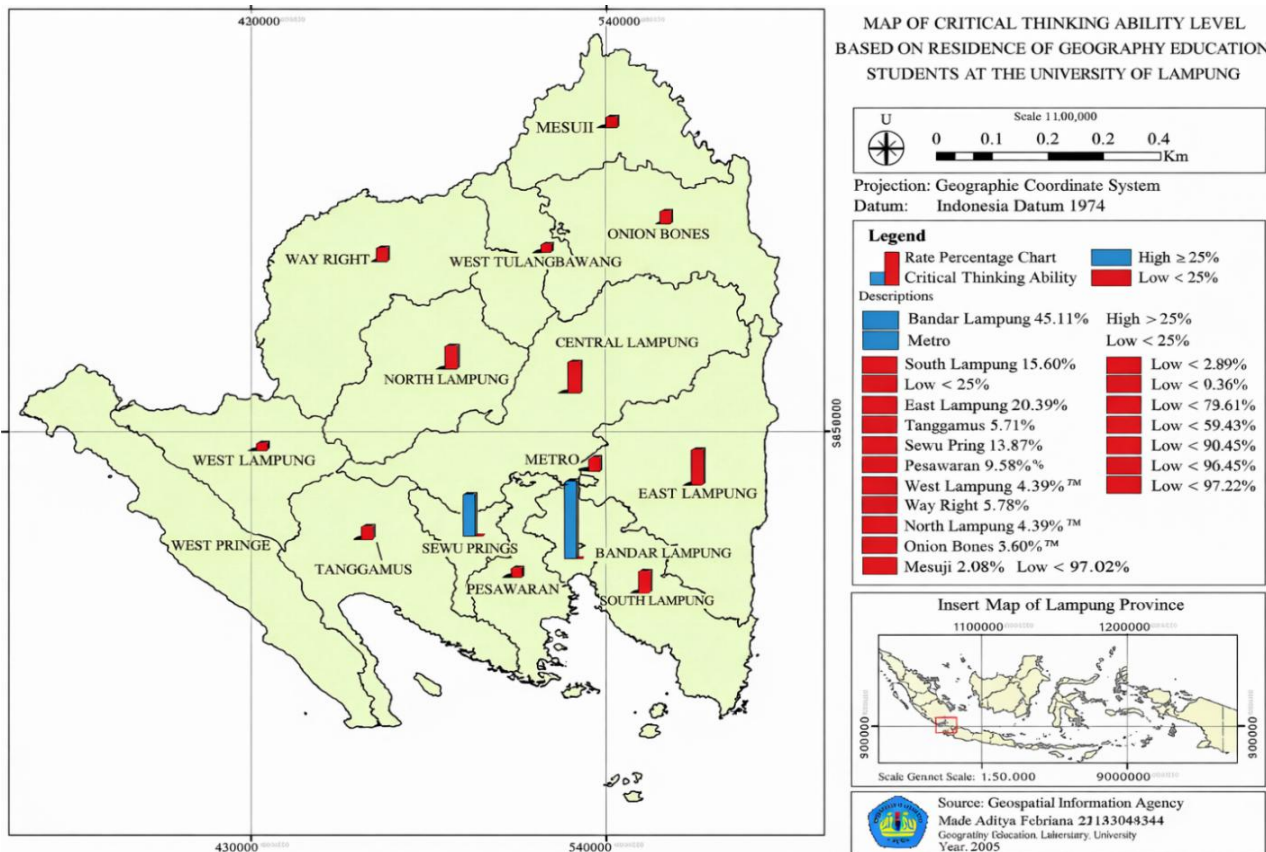


Figure 3. Map of Distribution of Research Respondents

Based on Figure 3, the distribution map of research respondents shows that all research respondents came from Lampung province. The distribution is categorized as follows: 16 respondents came from Bandar Lampung City, 9 respondents from Pringsewu Regency, 5 respondents from South Lampung Regency, 3 respondents from Metro City, 6 respondents from Central Lampung Regency, 2 respondents from Way Kanan Regency, 1 respondent from West Lampung Regency, 4 respondents from North Lampung Regency, 1 respondent from West Tulang Bawang Regency, 2 respondents from Tanggamus Regency, 7 respondents from East Lampung Regency, 2 respondents from Pesawaran Regency, 2 respondents from Tulang Bawang Regency, 1 respondent from Mesuji Regency, and there were no respondents from Pesisir Barat Regency.

Based on the results of the explanation regarding the profile of the research respondents, it can be concluded that this research involved 61 respondents who were active students of the Geography Education Study Program, class of 2023 and 2024. The respondents were divided into two gender categories, namely male and female, with all respondents coming from Lampung Province.

4.2 Characteristics of AI Use

This section presents the research results obtained from data collection using a questionnaire instrument distributed online via Google Form to students of the Geography Education Study Program at the University of Lampung as research respondents. Based on these results, the average percentage value for the AI usage variable (Variable X) was obtained. To facilitate reading the research results related to AI use, the data is presented in the following graphical form.

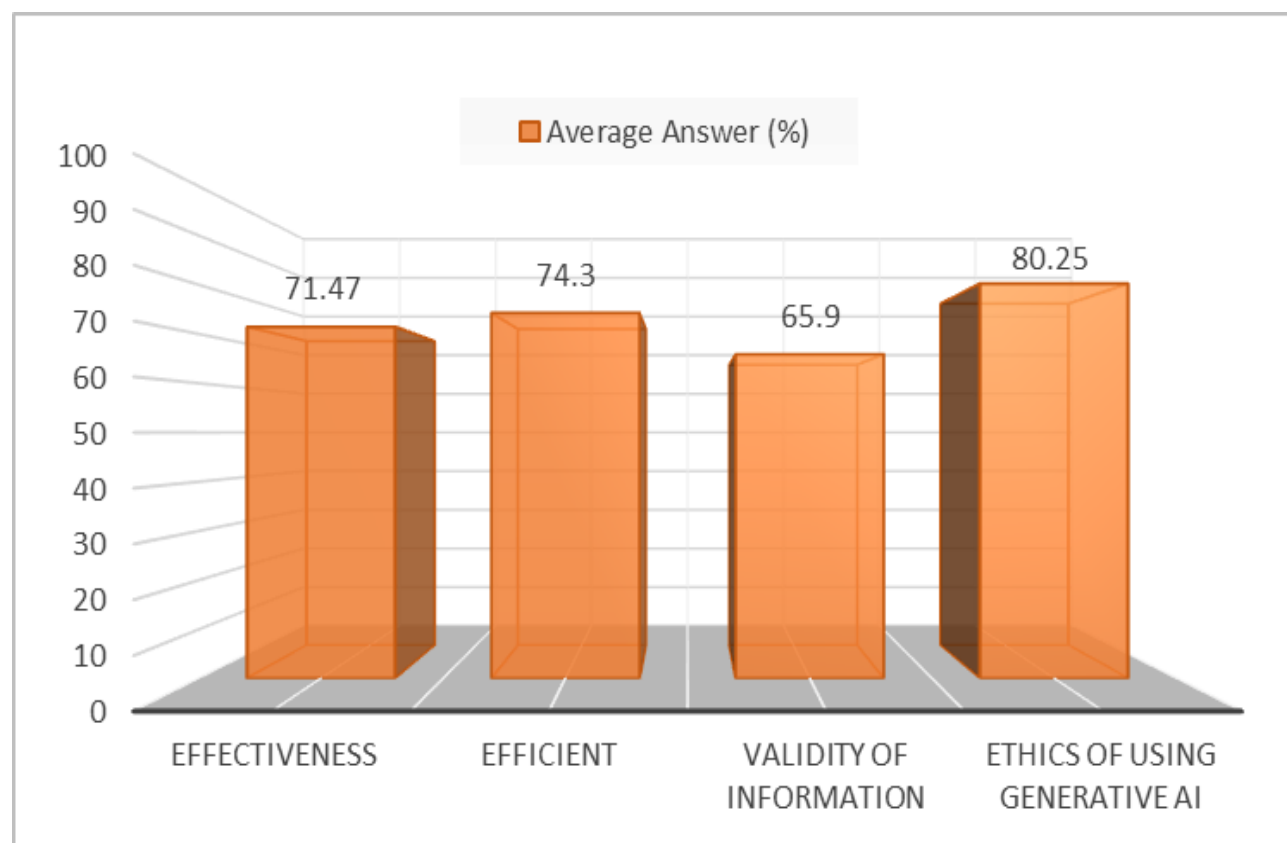


Figure 4. Average Percentage of AI Usage (Variable X) Source: Input graphic data using Microsoft Excel

Based on Figure 4, it shows the average percentage results of research on the use of AI that has been shared with 61 respondents with four indicators, namely effectiveness, efficiency, validity of information, and ethics of the use of generative AI. Each indicator is measured using a Likert scale with

five assessment categories that describe the different levels of influence of the use of AI on respondents. To determine the percentage obtained for each indicator, the interpretation category is used as explained below:

Table 2. Percentage Categories of AI Usage

| Percentage Range | Category |
|------------------|--------------------|
| 0-20 | Strongly Disagree |
| >20-40 | Disagree |
| >40-60 | Neutral (Moderate) |
| >60-80 | Agree |
| >80-100 | Strongly Agree |

Based on the categorization of AI usage in Table 1, it can be explained that the effectiveness indicator with an average percentage of 71.47% is categorized as agree. This result indicates that the majority of respondents assess the use of AI as having a good level of effectiveness in supporting the lecture process. Furthermore, the efficiency indicator with an average percentage of 74.3% is categorized as agree. This result indicates that the majority of respondents assess the use of AI as being quite efficient in helping them complete lecture assignments. Furthermore, the information validity indicator with an average percentage of 65.9% is categorized as agree. This result indicates that the majority of respondents always obtain valid information and always check the information obtained from using AI. Furthermore, the ethical indicator of the use of generative AI with an average percentage of 80.25% is categorized as strongly agree. This result indicates that the understanding and application of the Ethics of Using Generative AI by respondents is categorized as Very Good.

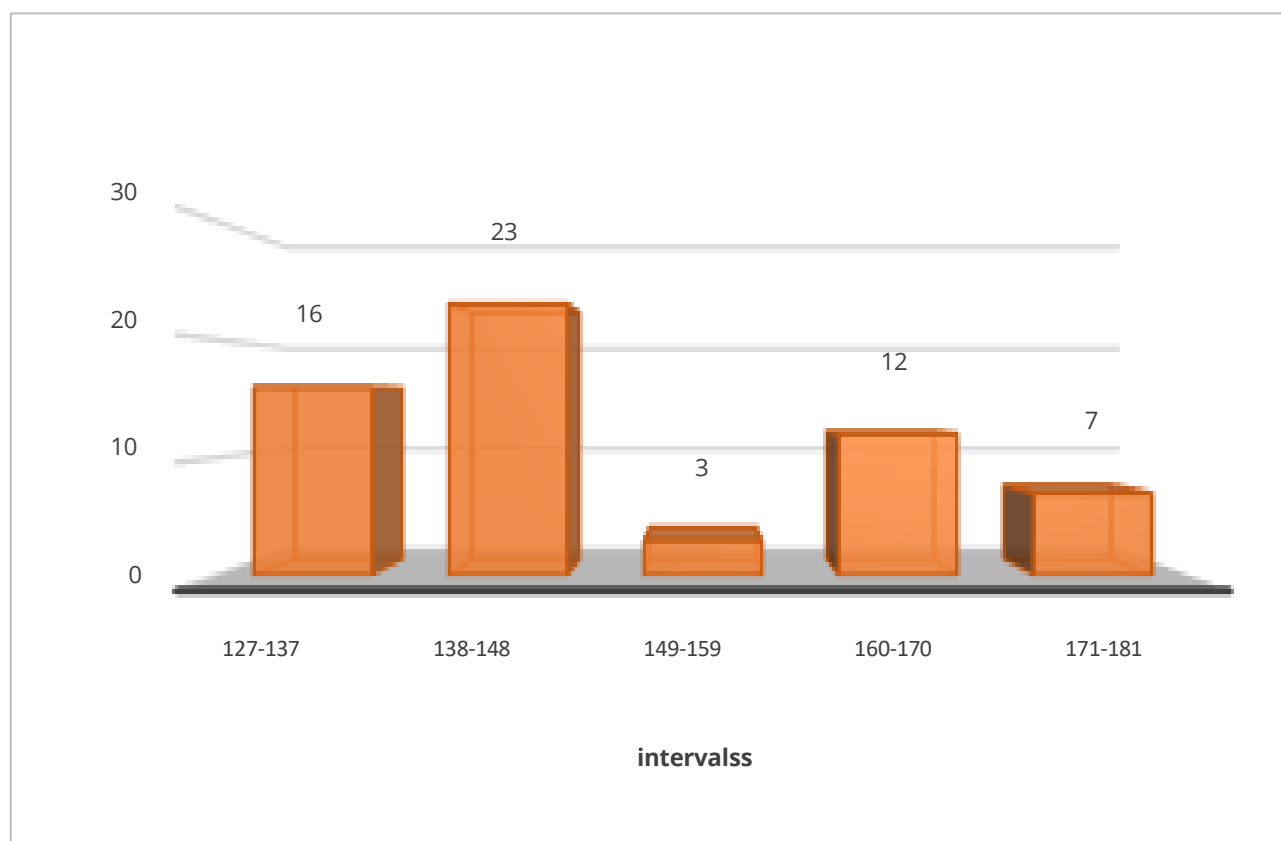


Figure 5. Accumulated Frequency Distribution Graph of AI Usage (Variable X)

Based on the accumulated data above on the AI Use variable, it shows that the frequency results with a value of 127-137, the number of respondents was 16 respondents with 9 male respondents and 7 female respondents with a percentage of 26.23% categorized as Strongly Disagree. Based on this category, it can be explained that respondents strongly disagree with the use of AI technology as an aid in the lecture process. Then, with a value of 138-148, the number of respondents was 23 respondents with 9 male respondents and 14 female respondents with a percentage of 37.7% categorized as Disagree. Based on this category, it can be explained that respondents disagree with the use of AI technology as an aid in the lecture process. Furthermore, with a value of 149-159, the number of respondents was 3 respondents with 3 female respondents with a percentage of 4.92% categorized as neutral. Based on this category, it can be explained that respondents felt quite agree with the use of AI technology as an aid in lectures. Then, with a value of 160-170, the number of respondents was 12 respondents with 1 male respondent category and 11 female respondents with a percentage of 19.67% categorized as agree. Based on this category, it can be explained that respondents assess the use of AI technology as an aid in lectures. And the value of 171-181, the number of respondents was 7 respondents with 1 male respondent category and 6 female respondents with a percentage of 11.48% categorized as Strongly Agree. Based on this category, it can be explained that respondents of the use of AI technology strongly agree with the use of AI as an aid in the lecture process.

4.3 Characteristics of Students' Critical Thinking Skills

Furthermore, based on these results, the average percentage value for the critical thinking ability variable (Variable Y) was obtained. To facilitate reading of the research results related to the use of AI, the data is presented in the following graph. Based on Figure 6, it shows the results of research on critical thinking skills that have been distributed to 61 respondents with 3 indicators, namely analysis, explanation, and inference. Each indicator is measured using a Likert scale with five assessment categories that describe the different levels of critical thinking skills of the respondents. To determine the percentage obtained for each indicator, the interpretation category is used as explained below:

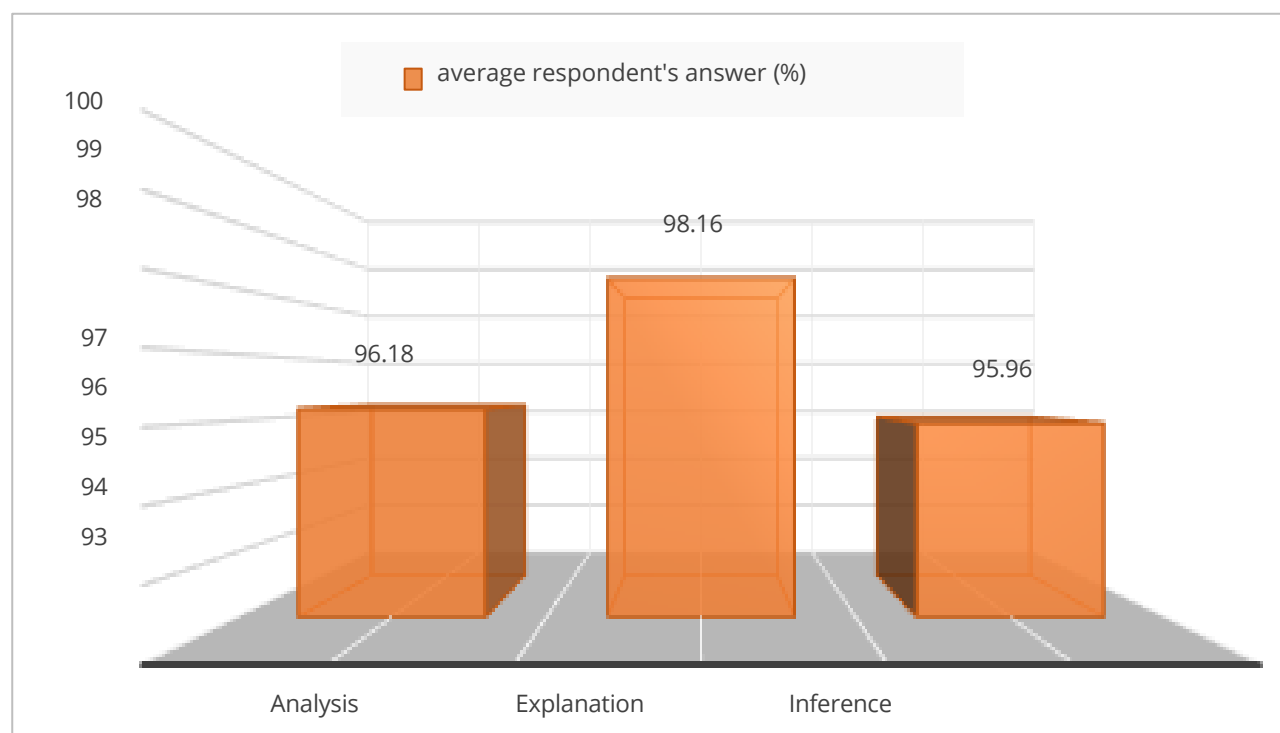
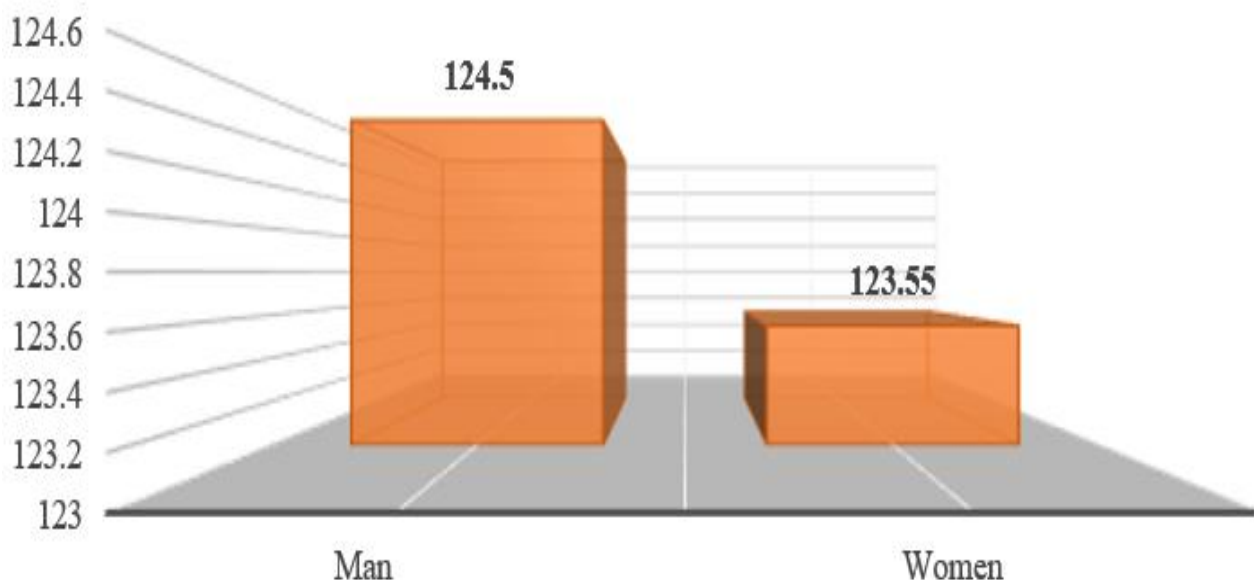


Figure 6. Average Percentage of Critical Thinking Ability (Variable Y)

Based on the AI usage categories in Table 2, it can be explained that the analysis indicator with an average percentage of 96.18% is categorized as strongly agree. This result indicates that almost all respondents still apply critical thinking skills by first analyzing the information obtained before using it. Furthermore, in the explanation indicator with an average percentage of 98.16% is categorized as



strongly agree. This result indicates that almost all respondents These results indicate that most respondents have applied critical thinking skills in the explanation indicator, namely by rewriting information obtained from AI based on their own understanding. This indicates that respondents not only receive information directly, but also try to understand and analyze it to fit the learning context faced. Furthermore, in the inference indicator with an average percentage of 95.96% is categorized as strongly agree. This result indicates that most respondents have applied critical thinking skills in the inference indicator, namely by drawing conclusions from information obtained through AI based on the results of their own analysis and reasoning. These results illustrate that respondents are able to link the information received with previous knowledge to produce logical and relevant conclusions in the learning context. The following is a comparison of critical thinking skills based on respondent gender

Figure 7. Average Critical Thinking Ability (Variable Y) of Respondents Based on Gender

Based on Figure 8 above, the average critical thinking ability of Geography Education students based on gender, obtained an average score with a total of 124.5 which is categorized as male respondents and an average score with a total of 123.55 which is categorized as female respondents. In general, this average result illustrates that male Geography Education students have a higher level of critical thinking ability compared to female students. This is in line with research conducted by (Suryati et al., 2024) which concluded that the critical thinking ability of male students is higher than that of female students. This is evidenced by the results of the average critical thinking ability score of male students reaching 40.13, while female students only 32.00. However, this research is quite interesting because it differs from the theory presented (Rusyana & Rinaldi, 2023) Previous research has suggested that women tend to think more reflectively, carefully, and systematically than men. The results of this study indicate that, in this context, critical thinking skills are influenced not only by biological or gender factors, but also by environmental factors, learning experiences, and the intensity of technology use.

Based on all the graphic data above, it can be concluded that although there is a difference between the average scores of critical thinking skills of men and women, the data results show that Geography Education students still have good critical thinking skills in utilizing AI as a learning tool. This can be seen from the high level of application of analysis, explanation, and inference indicators, which shows that students do not only use AI passively, but are also able to analyze, explain, and draw conclusions

independently on the information obtained, to see in more detail the research results are presented based on several indicators.

Based on the results of the questionnaire that has been distributed to 61 respondents with the Critical Thinking Ability Variable, there are the Highest Score (NT) which is 125, the Lowest Score (NR) which is 109, and 5 Categories with an interval length of 3.2. Based on the scores that have been obtained, the interval length can be categorized as follows; (a) Scores of 109-112 are categorized as very ineffective by 3 respondents ;(b) Scores of 113-116 are categorized as less effective by 3 respondents; (c) Scores of 117-120 are categorized as quite effective by 5 respondents ;(d) Scores of 121-124 are categorized as effective by 39 respondents ; (e) Scores of 125-128 are categorized as very effective by 11 respondents Furthermore, it can be grouped using the percentage formula with the following results.

Table 4. Frequency Distribution of Critical Thinking Ability Variables

| No | Interval | Man | Woman | Frequency | Percentage | Category |
|----|---------------|-----|-------|-----------|-------------|-------------------|
| 1 | 109-112 | 0 | 3 | 3 | 4.92% | Strongly Disagree |
| 2 | 113-116 | 1 | 2 | 3 | 4.92% | Don't agree |
| 3 | 117-120 | 2 | 3 | 5 | 8.2% | Neutral |
| 4 | 121-124 | 11 | 28 | 39 | 63.93% | Agree |
| 5 | 125-128 | 6 | 5 | 11 | 18.03% | Strongly agree |
| | Amount | | | 61 | 100% | |

Based on the data in table 4. above, which displays the measurement results of the Critical Thinking Ability Variable, the results can be presented in the form of a graph which aims to provide a clearer picture of the Critical Thinking Ability Variable as follows.

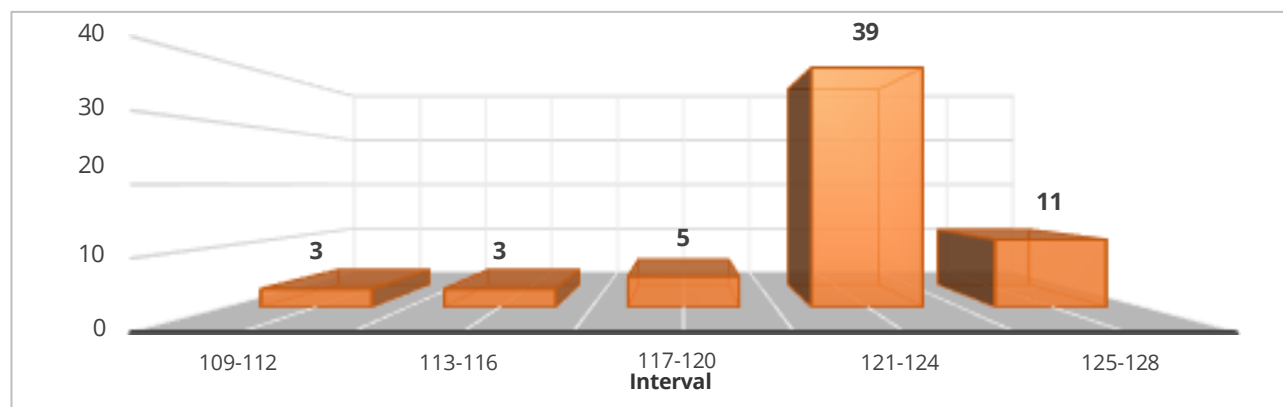


Figure 8. Frequency Distribution Graph of Critical Thinking Ability Variables

Based on the accumulated data above on the Critical Thinking Ability variable, it shows that the frequency results with a value of 109-112, the number of respondents is 3 respondents with the category of female respondents as many as 3 with a percentage of 4.92% who are categorized as strongly disagree. Based on this category, it can be explained that respondents assess the use of AI does not provide changes to Respondents' Critical Thinking Ability. Then with a value of 113-116, the number of respondents is 3 respondents with the category of male respondents as many as 1 and female respondents as many as 2 with a percentage of 4.92% who are categorized as disagree. Based on this category, it can be explained that respondents assess the use of AI does not provide changes to respondents' Critical Thinking Ability. Furthermore, with a value of 117-120, the number of respondents is 5 respondents with the category of male respondents as many as 2 and female respondents as many as 3 with a percentage of 8.2% who are categorized as Neutral. Based on this category, it can be explained that respondents assess the use of AI provides changes to respondents' Critical Thinking Ability. Furthermore, with a value of 121-124, the number of respondents was 39 respondents with 11 male respondents and 28 female respondents with a percentage of 63.93% who were categorized as agreeing.

Based on this category, it can be explained that respondents considered the use of AI to provide changes to respondents' Critical Thinking Skills. And with a value of 125-128, the number of respondents was 11 respondents with 6 male respondents and 5 female respondents with a percentage of 18.03% who were categorized as Strongly agreeing. Based on this category, it can be explained that respondents considered the use of AI to provide changes to respondents' Critical Thinking Skills. Next, a Prerequisite test was carried out.

4.4 The Impact of AI (Artificial Intelligence) Use on Critical Thinking Skills

This normality test is essentially conducted to assess whether the research data used is normally distributed. The data used for the prerequisite tests, which include normality, linearity, and homogeneity tests, are data from the AI (artificial intelligence) usage variable and the Critical Thinking Skills variable. The results of the prerequisite tests, consisting of normality, linearity, and homogeneity tests using SPSS 22 on the data used in this study, are shown in the following table.

Table 5. Results of Prerequisite Tests

| Test | Parameter | Significance Value | Conclusion |
|------------------|--------------------------|--------------------|----------------------|
| Normality Test | Exact Sig. (2-tailed) | 0.064 | Normal (> 0.05) |
| Linearity Test | Deviation from Linearity | 0.603 | Linear (> 0.05) |
| Homogeneity Test | Based on trimmed mean | 0.171 | Homogeneous (> 0.05) |

Source: Statistical Processing Using SPSS Version 22.

Table 6. Results of Simple Linear Regression Test (ANOVA)

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|------------|----------------|----|-------------|-------|-------|
| Regression | 86.521 | 1 | 86.521 | 7.287 | .009b |
| Residual | 700.496 | 59 | 11.873 | | |
| Total | 787.016 | 60 | | | |

a. Dependent Variable: Critical Thinking Skills. b. Predictors: (Constant), Use of AI. Source: Statistical Processing Using SPSS Version 22.

Based on the simple linear regression test results, the calculated F value is 7.287 with a significance level of $0.009 < 0.05$. Therefore, it can be concluded that there is a significant influence between the use of AI (Variable X) on Critical Thinking Skills (Variable Y).

Table 7. Coefficients of Simple Linear Regression Test

| Model | B | Std. Error | Beta | t | Sig. |
|------------|---------|------------|--------|--------|------|
| (Constant) | 133.244 | 4.491 | | 29.672 | .000 |
| Use of AI | -0.081 | 0.030 | -0.332 | -2.699 | .009 |

a. Dependent Variable: Critical Thinking Skills. Source: Statistical Processing Using SPSS Version 22.

The results show a constant value (a) of 133.244 and a regression coefficient for the AI Use variable (b) of -0.081, resulting in the equation $Y = 133.244 - 0.081X$. The negative regression coefficient indicates a negative influence between the use of AI (Variable X) on Critical Thinking Ability (Variable Y). Substantively, this means that the higher the use of AI, the lower the Critical Thinking Ability.

Table 8. Results of R-Square Calculation (Model Summary)

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------|----------|-------------------|----------------------------|
| 1 | .332a | .110 | .095 | 3.44569 |

a. Predictors: (Constant), Use of AI. Source: Statistical Processing Using SPSS Version 22.

The coefficient of determination (R^2) is 0.110, meaning that 11% of the variance in Critical Thinking Skills is explained by AI Use. The remaining 89% is influenced by other factors outside the scope of this study.

4.5 Discussion

This study aims to analyze the effect of the use of Artificial Intelligence (AI) on the critical thinking skills of Geography Education students at the University of Lampung. The results of a simple linear regression analysis show an F-value of 7.287 with a significance level of $0.009 < 0.05$. This finding proves that there is a significant influence between the use of AI (variable X) on critical thinking skills (variable Y). However, the main finding of this study is the negative nature of the influence, indicated by the regression coefficient (b) value of -0.081 (Equation $Y = 133.244 - 0.081X$). The coefficient of determination (R^2) of 0.110 indicates that the use of AI contributes a negative influence of 11% on critical thinking skills. Substantively, this means that the higher the use of AI, the lower the students' critical thinking skills.

The study results show that the use of AI is negative, proving that the level of responsibility and awareness of respondents in using AI is still relatively low. Data analysis reveals several contributing factors. First, the lack of digital literacy and understanding of the ethics of using generative AI. Students tend to use AI passively and instantly, as evidenced by efficiency data (74.3% agree) and a tendency to trust AI's accuracy (65.9% agree on the validity indicator). This dependence, without a balanced verification process, reduces the ability to independently assess the truth and relevance of information. The results of this study are strengthened by research conducted by Aida Fiqtianisa and Purwanti (2025) with the title *The Importance of Digital Literacy to Improve Students' Critical Thinking and Problem-Solving Skills in the Digital Era*. In his research, he explained that digital literacy has a very important role in developing students' critical thinking skills, because through digital literacy, students are able to access, assess, and manage information appropriately and use technology wisely in the learning process. (Fiqtianisa & Purwanti, 2025).

Second, easy access and the absence of clear regulations in the academic environment encourage uncontrolled AI usage patterns. When AI becomes the primary source of answers, students tend to passively accept information without evaluation. These research findings are supported by research conducted by Aris Zaputra et al. (2025) entitled "Strategies for Improving Student Digital Literacy Through Controlled Utilization of Artificial Intelligence (AI) at Al Washliyah Darussalam University, Banda Aceh." The study explains that easy access to AI technologies such as ChatGPT, Gamma, and Canva AI has encouraged students to use AI spontaneously without any clear guidance or regulation from the university. (Zaputra et al., 2025). Third, academic pressures and demands for time efficiency encourage students to use AI as a shortcut, rather than as a reflective learning tool. The focus shifts from the thinking process to quick results. This finding is further supported by interviews, which stated that AI is used because it is "easy, fast, and practical," and to overcome "difficulties in stringing words together to avoid plagiarism." This indicates that AI is used as a substitute for the thinking process, rather than as a support. These research findings are supported by research conducted by Praharisti Kurniasari (2025) entitled "The Dependence of Artificial Intelligence (AI) Use on Students' Academic Assignments." Her research explains that the use of AI in education provides convenience and efficiency in completing academic assignments. (Kurniasari et al., 2025).

Next, this study analyzed other factors that influenced the remaining 89% of the variance. The test results showed that gender had a significant influence (significance value $0.046 < 0.05$), where men had slightly higher critical thinking skills (average 122.500) than women (120.537). This suggests that learning environment factors and intensity of technology use may play a greater role than gender alone. Another influential factor is location of residence.

5. CONCLUSION

Based on the results of research and discussion regarding the influence of the use of Artificial Intelligence (AI) on the critical thinking skills of students in the Geography Education Study Program, FKIP, University of Lampung, the following conclusions can be drawn.

First, the characteristics of AI use by Geography Education students at the University of Lampung are quite high. The majority of students have recognized and utilized AI as an aid in the lecture process, especially for completing academic assignments, searching for references, obtaining information, and finding relevant learning resources. Despite the high level of utilization, students' attitudes show a tendency to be quite selective, as reflected in the average percentage of AI use of 72.99%.

Second, the characteristics of the critical thinking skills of Geography Education students at the University of Lampung are generally in the good category, with an overall average percentage above 95%. Students still demonstrate strong abilities in the three main indicators of critical thinking: analysis, explanation, and inference. Furthermore, students' critical thinking skills are also influenced by factors other than AI use, such as gender and location of residence.

Third, the use of AI has a significant and negative influence on the critical thinking skills of Geography Education students at the University of Lampung. The results of a simple linear regression analysis show that the contribution of AI use is 11% ($R^2 = 0.110$) with a significance value of $0.009 < 0.05$. The negative influence is most felt in the inference indicator, confirming that the higher the passive dependence of students on AI output, the more their critical thinking skills decline.

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