

THE EFFECT OF ARTIFICIAL INTELLIGENCE ON CRITICAL THINKING IN STUDENT LEARNING

^{*1}Dinda Aulia, ²Misrah

^{*1,2}Universitas Islam Negeri Sumatera Utara

Email: ^{*1}dinda0102222036@uinsu.ac.id, ²misrah@uinsu.ac.id

Abstract

The use of Artificial Intelligence in higher education is increasing and has the potential to influence students' critical thinking skills. This study aims to analyze the effect of Artificial Intelligence use on the critical thinking skills of students in the Islamic Guidance and Counseling Study Program at Universitas Islam Negeri Sumatera Utara and to examine the tendency in the strength of this effect among students from the 2022 and 2025 cohorts. This study employed a quantitative approach using a simple linear regression design. The design was used to examine the effect of Artificial Intelligence use as the independent variable on students' critical thinking skills as the dependent variable. The study population consisted of 114 active students from the 2022 and 2025 cohorts, all of whom were included as respondents through saturated sampling. Data were collected using a four-point Likert-scale questionnaire and analyzed using simple linear regression. The research instrument met the validity criteria and demonstrated very high reliability, with a Cronbach's Alpha coefficient of 0.925. The findings showed that Artificial Intelligence had a positive and significant effect on students' critical thinking skills, with a regression coefficient of 0.526, a *t*-value of 7.814, and a significance value of 0.000. The coefficient of determination of 0.347 indicated that Artificial Intelligence use explained 34.7% of the variance in students' critical thinking skills, while the remaining 65.3% was influenced by factors outside the research model. Separate regression analyses by cohort showed that the contribution of Artificial Intelligence use was greater among students in the 2022 cohort, with an R^2 value of 0.243, than among students in the 2025 cohort, with an R^2 value of 0.104. These findings confirm that Artificial Intelligence can support critical thinking skills when it is used actively to explore information, evaluate responses, compare perspectives, and construct arguments. Therefore, learning in the Islamic Guidance and Counseling Study Program should integrate Artificial Intelligence critically, reflectively, and ethically while maintaining a focus on strengthening students' independent learning.

Keywords: Artificial Intelligence, Critical Thinking, Learning

Abstrak

Pemanfaatan kecerdasan buatan (Artificial Intelligence) dalam pendidikan tinggi semakin meningkat dan berpotensi memengaruhi kemampuan berpikir kritis mahasiswa. Penelitian ini bertujuan untuk menganalisis pengaruh penggunaan kecerdasan buatan terhadap kemampuan berpikir kritis dalam belajar mahasiswa Program Studi Bimbingan dan Penyuluhan Islam (BPI) Universitas Islam Negeri Sumatera Utara, serta melihat kecenderungan kekuatan pengaruh pada mahasiswa angkatan 2022 dan 2025. Penelitian

ini menggunakan pendekatan kuantitatif dengan desain regresi linear sederhana. Desain tersebut digunakan untuk menguji pengaruh penggunaan kecerdasan buatan sebagai variabel independen terhadap kemampuan berpikir kritis mahasiswa sebagai variabel dependen. Populasi penelitian terdiri atas 114 mahasiswa aktif angkatan 2022 dan 2025 yang seluruhnya dijadikan responden melalui teknik sampel jenuh. Data dikumpulkan menggunakan kuesioner dengan skala Likert empat poin dan dianalisis menggunakan regresi linear sederhana. Instrumen penelitian telah memenuhi kriteria validitas dan memiliki reliabilitas sangat tinggi dengan nilai Cronbach's Alpha sebesar 0,925. Hasil penelitian menunjukkan bahwa kecerdasan buatan berpengaruh positif dan signifikan terhadap kemampuan berpikir kritis mahasiswa, dengan koefisien regresi sebesar 0,526, nilai t sebesar 7,814, dan nilai signifikansi sebesar 0,000. Nilai koefisien determinasi sebesar 0,347 menunjukkan bahwa penggunaan kecerdasan buatan mampu menjelaskan 34,7% variasi kemampuan berpikir kritis mahasiswa, sedangkan 65,3% sisanya dipengaruhi oleh faktor-faktor lain di luar model penelitian. Analisis regresi secara terpisah berdasarkan angkatan menunjukkan bahwa kontribusi pengaruh kecerdasan buatan lebih besar pada mahasiswa angkatan 2022 dengan nilai R^2 sebesar 0,243 dibandingkan mahasiswa angkatan 2025 dengan nilai R^2 sebesar 0,104. Temuan ini menegaskan bahwa kecerdasan buatan dapat mendukung kemampuan berpikir kritis apabila digunakan secara aktif untuk mengeksplorasi informasi, mengevaluasi jawaban, membandingkan perspektif, dan menyusun argumentasi. Oleh karena itu, pembelajaran pada Program Studi Bimbingan dan Penyuluhan Islam perlu mengintegrasikan kecerdasan buatan secara kritis, reflektif, dan etis, serta tetap berorientasi pada penguatan kemandirian belajar mahasiswa.

Kata Kunci: Kecerdasan Buatan, Berpikir Kritis, Pembelajaran

INTRODUCTION

The development of digital technology in the era of the 4.0 Industrial Revolution and Society 5.0 has driven various changes in higher education, one of which is through the use of artificial intelligence (AI) (Sharab, Butul, & Guha, 2024). Artificial intelligence is a computing technology that can process information, recognize patterns, give recommendations, and generate text as well as initial solution alternatives for various problems (Banegas, Tur, & Tierno, 2024; Zuhairi & Iskandar, 2026). In learning, artificial intelligence can be used through chatbots, translation apps, recommendation systems, and generative artificial intelligence to help students get information, understand the material, complete assignments, and get feedback quickly.

The use of artificial intelligence has the potential to boost learning efficiency, understanding of concepts, creativity, and problem-solving skills if used in a focused way (Gerlich, 2025; Dibek, Kursad, & Erdogan, 2025). However, the ease of getting instant answers can also encourage students to accept information without checking sources, analyzing arguments, or reflecting. Passively using artificial intelligence can lead to dependence on technology, reduce independent learning, and weaken critical thinking. (Walter, 2024; Aprianto, Sofyan, Rahmawati, & Sufyadi, 2025). Therefore, artificial intelligence can have both positive and negative effects on critical thinking skills, depending on how students and lecturers integrate it into the learning process.

Critical thinking is the ability to identify problems, analyze information, evaluate evidence, compare sources, build arguments, and make decisions rationally (Misrah & Hambali, 2024). This ability is important so that students don't just passively receive digital information, but are able to judge the accuracy, relevance, and reliability of the information they get, including information produced by artificial intelligence (Alam & Mosallami, 2024; Shahzad, Raza, Malhi, Ain, & Malhi, 2025).

For students in the Islamic Guidance and Counseling Study Program at the State Islamic University of North Sumatra, critical thinking skills are particularly important. Students are trained to understand individual, family, social, psychological, and religious issues in a humane and ethical way, based on Islamic values. BPI students need to be able to assess the validity of information, understand the context of problems, and determine the right solutions. Artificial intelligence can help students get information and initial ideas, but its use still needs to be accompanied by the ability to evaluate content, check source validity, understand social context, and align information with Islamic values.

The problem that arises is that artificial intelligence isn't always used as a tool to deepen analysis, discussion, reflection, and argument development. Some students tend to use AI to speed up completing assignments without double-checking the answers it produces. This can affect their understanding of the material and their independence in solving problems. On the other hand, using AI wisely to ask questions, compare opinions, test arguments, and evaluate information can help strengthen students' critical thinking skills.

Previous research (Mawaddah, Agustina, Amalia, Raharjo, & Amin, 2025; Hassen, 2025) shows varied results. Artificial intelligence can support critical thinking if used for exploration, discussion, reflection, and evaluation of answers. On the other hand, using artificial intelligence just to quickly get tasks done can reduce students' involvement in independent reasoning. However, research (Rojas, Ullauri, & Vargas, 2024) still sees artificial intelligence as a general variable and hasn't clearly distinguished between productive use of artificial intelligence and passive use. Also, research (Liu & Wang, 2024) Regarding the impact of artificial intelligence on critical thinking, it is still mostly being done in the fields of technology, science, general education, and business.

The gap in this research lies in the still limited empirical studies on the effect of using artificial intelligence on the critical thinking skills of students in the Islamic Guidance and Counseling Study Program, especially at Islamic higher education institutions. Previous studies generally examined the impact of artificial intelligence on students' critical thinking in general without considering possible differences in the magnitude of the effect based on students' academic characteristics, such as year or learning experience at the university. In fact, differences in year can reflect variations in academic experience, level of adaptation to the academic culture, intensity of analytical assignments, as well as maturity in using artificial intelligence critically and ethically. Therefore, this research not only tests the effect of using artificial intelligence on students' overall critical thinking

skills, but also analyzes the contribution of that effect separately for the 2022 and 2025 student cohorts.

The novelty of this research lies in analyzing the impact of using artificial intelligence on the critical thinking skills of BPI students at the State Islamic University of North Sumatra by comparing the tendency of the influence magnitude on two cohorts with different academic experiences, namely the 2022 and 2025 cohorts. This study positions artificial intelligence as a learning tool that can have either a positive or negative effect on critical thinking skills, depending on the quality of its use. The cohort-based analysis is conducted to get an idea of the differences in the contribution of AI's influence on critical thinking skills between students who already have longer academic experience and those who are still in the early stages of adapting to university learning. The research results are expected to serve as a basis for lecturers and study programs in designing AI-based learning that matches students' needs, academic experiences, and readiness levels, while still promoting learning independence, academic integrity, ethical use of technology, and critical thinking skills.

METHOD

This study uses a quantitative approach with an explanatory design to analyze the effect of using artificial intelligence (AI) on students' critical thinking skills in learning. A quantitative approach was chosen because this study focuses on measuring the relationships between variables using numerical data obtained from questionnaire responses and analyzed statistically (Creswell, 2024). The independent variable in this study is the use of artificial intelligence, while the dependent variable is the students' critical thinking ability.

The data analysis was done using simple linear regression to test the direction, magnitude, and significance of the effect of artificial intelligence usage on students' critical thinking skills (Field, 2018; Ghozali, 2021). The regression model used is $(Y = a + bX + e)$, where (Y) is students' critical thinking skills, (a) is the constant, (b) is the regression coefficient, (X) is the use of artificial intelligence, and (e) is the error or the influence of other variables outside the research model. To see the trend of the strength of the effect in different groups, regression analysis was also conducted separately for students from the 2022 batch and the 2025 batch (Field, 2018).

This research was conducted in the Islamic Guidance and Counseling Study Program (BPI), Faculty of Da'wah and Communication, State Islamic University of North Sumatra. The research population consisted of 114 active BPI students from the 2022 and 2025 cohorts. The sampling technique used was a saturated sample, meaning all members of the population were used as research respondents because the population size could be reached entirely (Sugiyono, 2024).

Data was collected through an online questionnaire using Google Form. The research instrument was designed using a four-point Likert scale, which includes Strongly Disagree, Disagree, Agree, and Strongly Agree. The Likert scale is used to measure

students' attitudes, perceptions, and response tendencies regarding the use of artificial intelligence as well as critical thinking skills in learning (Likert, 1932; Sugiyono, 2024). Indicators of using artificial intelligence include using AI to search for information, understand material, complete assignments, get ideas, and evaluate answers. Meanwhile, indicators of critical thinking skills include the ability to identify problems, analyze information, evaluate sources and arguments, draw conclusions, and make decisions rationally (Facione, 1990).

Before being used for data collection, the research instrument was tested for validity and reliability. Item validity was tested through the correlation between each item's score and the total score, while the instrument's reliability was tested using Cronbach's Alpha coefficient. The instrument is considered reliable if it has a Cronbach's Alpha value of at least 0.60, while a value of 0.70 or higher indicates a good level of internal consistency (Hair, Black, Babin, & Anderson, 2019; Nunnally & Bernstein, 1994).

The data analysis steps include data coding, tabulation, descriptive statistics, validity testing, reliability testing, regression assumption testing, and hypothesis testing. Regression assumption tests include residual normality tests, linearity tests, and heteroscedasticity tests. Hypothesis testing is done using the t-test, while the coefficient of determination (R^2) is used to find out the proportion of variation in students' critical thinking skills that can be explained by the use of artificial intelligence. All data are analyzed using IBM SPSS Statistics and Microsoft Excel (Ghozali, 2021).

RESULTS AND DISCUSSION

Validity Test and Reliability Test

The validity test is determined based on the calculation of the artificial intelligence r table at a 5% significance level ($\alpha = 0.05$). With a research sample of 114 respondents, the degrees of freedom (df) are 100, resulting in an r table value of 0.195. An item is considered valid if the calculated artificial intelligence r is greater than the r table.

Table 1. Results of Validity and Reliability Tests

VARIABLE	INITIAL NUMBER OF ITEMS	VALID ITEMS	INVALID ITEMS	SIG.	R- TABLE	CRONBACH'S ALPHA	REMARK
ARTIFICIAL INTELLIGENCE	15	15	0	< 0.05	0.195	–	Valid
CRITICAL THINKING	15	15	0	< 0.05	0.195	–	Valid
TOTAL	30	30	0	–	–	0.925	Reliable

The validity test results for the artificial intelligence variable and the critical thinking skills variable of BPI students show that all statement items are considered valid. This is proven by the fact that the calculated r value for each artificial intelligence item is greater

than the table r value of 0.195 ($df = 115$, $\alpha = 0.05$). Therefore, all items on both variables are suitable to be used as instruments in this research data collection. Based on the reliability test results, the questionnaire for the artificial intelligence variable and the critical thinking skills of BPI students is considered highly reliable. This is proven by the artificial intelligence's Cronbach's Alpha value of 0.925, which is way above the minimum limit of 0.60. So, this research instrument has a very high level of internal consistency and is fit to be used for data collection.

Classical Assumption Test

Table 2. Results of the Classic Assumption Test

TEST TYPE	INDICAT OR	ARTIFICIAL INTELLIGEN CE SIG. VALUE	CRITER IA	REMARK
NORMALITY	Kolmogoro v-Smirnov	0.230	> 0.05	Normal
LINEARITY	Linearity	0.000	< 0.05	Linear
LINEARITY	Deviation from Linearity	0.080	> 0.05	Linear
HETEROSCEDASTI CITY	Glejser Test	0.502	> 0.05	No Heteroscedasti city Detected
HOMOGENEITY	Levene's Test	0.335	> 0.05	Homogeneous

Normality testing is done to see whether the data, especially the residuals in a regression model, follow a normal distribution or not. The goal is to ensure that the regression model used meets statistical requirements so that the analysis results can be interpreted correctly and reliably. Based on the normality test results using the Monte Carlo approach, a significance value of 0.230 was obtained. Since this value is greater than 0.05, it can be concluded that the research data is normally distributed.

Linearity testing is done to find out whether the relationship between the independent variable (X) and the dependent variable (Y) is linear. In regression analysis, both variables need to have a linear relationship pattern for the model to work properly. Based on the results of the linearity test, the significance value for Deviation from Linearity is 0.080, so it can be concluded that there is no deviation from linearity.

Heteroscedasticity testing is a test done to find out whether there is inequality in the residual variance in a regression model. A properly constructed regression model should not experience heteroscedasticity, so the residual variance in the data should be constant. In this study, heteroscedasticity testing was carried out using the Glejser test. The test results showed a significance value of 0.502 (> 0.05), so it can be concluded that there are no signs of heteroscedasticity in the regression model.

Homogeneity test is a test conducted to find out whether the data variance in two research groups has a relatively similar or homogeneous spread. In this study, the homogeneity test was conducted on students from the 2022 and 2025 cohorts using Levene's Test before performing separate regression analysis. The results of the homogeneity test

showed a significance value of 0.335 (> 0.05), so it can be concluded that the data variance between the two groups is homogeneous. Therefore, the data from the 2022 and 2025 cohorts have relatively similar distribution characteristics, allowing the regression analysis to proceed.

Simple Linear Regression Test

Table 3. Results of the Simple Linear Regression Test

GROUP	B	R	R ²	T	SIG.	CRITERIA	CONCLUSION
OVERALL	0.526	0.589	0.347	7.814	0.000	< 0.05	Significant
2022	0.493	0.493	0.243	4.703	0.000	< 0.05	Significant
2025	0.354	0.323	0.104	2.185	0.035	< 0.05	Significant

The results of the simple linear regression analysis show that the artificial intelligence variable has a regression coefficient (B) of 0.526, which is positive. This indicates that every increase in the use of artificial intelligence will be followed by an increase in students' critical thinking skills. Meanwhile, the coefficient of determination (R²) of 0.347 shows that artificial intelligence contributes 34.7% to critical thinking skills, while the rest is influenced by factors outside the study. The hypothesis test results show that the calculated t-value of 7.814 is greater than the table t-value of 1.659, with a significance of 0.000 (< 0.05). This indicates that artificial intelligence has a positive and significant effect on students' critical thinking skills. Therefore, the research hypothesis is accepted. To see the trend of the influence strength in each cohort, regression analysis was conducted separately for the 2022 and 2025 students.

In the 2022 cohort, the regression results showed that the artificial intelligence t-statistic was greater than the t-table ($4.703 > 1.994$) with a significance of 0.000 (< 0.05). This indicates that artificial intelligence has a positive and significant effect on the critical thinking skills of students in the 2022 cohort. Meanwhile, the artificial intelligence coefficient of determination (R²) of 0.243 shows that artificial intelligence contributes 24.3% to the critical thinking abilities in this group.

Meanwhile, for the 2025 cohort, the computed artificial intelligence t-value was 2.185, which is also higher than the table t-value of 2.018, with a significance of 0.035 (< 0.05). These results show that artificial intelligence also has a positive and significant effect on the critical thinking skills of students in the 2025 cohort. However, the coefficient of determination for artificial intelligence in the 2025 cohort is 0.104, indicating that the contribution of artificial intelligence's influence on this group is smaller compared to the 2022 cohort. Therefore, the separate regression results show that the influence of artificial intelligence on critical thinking skills tends to be stronger for students in the 2022 cohort compared to the 2025 cohort.

Discussion

The research results show that the instrument measuring the use of artificial intelligence and students' critical thinking abilities has good measurement quality. All 30 statement items were declared valid because the correlation value of each item exceeded the table (r) value of 0.195. Additionally, a Cronbach's Alpha value of 0.925 indicates a very high level of internal consistency. These results confirm that the research instrument can consistently measure students' use of artificial intelligence and critical thinking skills. In quantitative research, the quality of the instrument is a very important aspect because the accuracy of statistical analysis results is greatly influenced by the validity and reliability

of the measuring tools used. A valid instrument shows that each item is able to measure the intended construct, while high reliability indicates that the instrument provides stable and consistent results when used on respondents with the same characteristics. Therefore, the results of the instrument test in this study provide a sufficient basis to proceed with the analysis of the impact of using artificial intelligence on students' critical thinking skills.

The results of the regression assumption test also show that the research data meet the requirements for analysis using simple linear regression. The normality test significance value of 0.230 indicates that the residuals in the regression model are normally distributed. This is important because residual normality supports the accuracy of testing the significance of the regression coefficients. Furthermore, a Deviation from Linearity value of 0.080, which is greater than 0.05, shows that the pattern of the influence of artificial intelligence use on critical thinking skills meets the linearity assumption. This means that changes in artificial intelligence use can be analyzed through a pattern of influence that is linear on students' critical thinking skills. The Glejser test result of 0.502 also shows that the regression model does not have heteroscedasticity issues, so the residual variance can be considered relatively constant. In addition, the Levene's Test result of 0.335 indicates that the data from 2022 and 2025 students have relatively homogeneous variances. With the assumptions of normality, linearity, homoscedasticity, and homogeneity met, the regression model used can provide a more reliable picture of the impact of AI use on students' critical thinking skills.

The results of the simple linear regression analysis show that the use of artificial intelligence has a positive and significant effect on the critical thinking skills of students in the Islamic Guidance and Counseling Study Program at the State Islamic University of North Sumatra. The regression coefficient value of 0.526 indicates that any increase in the use of artificial intelligence is generally followed by an increase in students' critical thinking skills. The t-value of 7.814 with a significance of 0.000 strengthens the conclusion that this effect is statistically significant. Therefore, the research hypothesis stating that the use of artificial intelligence affects students' critical thinking skills can be accepted.

The coefficient of determination value ($R^2 = 0.347$) shows that the use of artificial intelligence contributes about 34.7% to the variation in students' critical thinking skills. This contribution can be considered fairly significant in the context of university learning. However, the results also indicate that 65.3% of the variation in critical thinking skills is influenced by factors outside the research model. These factors may include learning motivation, digital literacy, information literacy, initial academic ability, learning experiences, teaching strategies, academic discussion intensity, reading culture, learning independence, scientific writing skills, friendship environment, and students' access to credible learning resources. Therefore, artificial intelligence should be understood as one of the factors that can affect critical thinking, not as the only determining factor.

Critical thinking skills are complex because they involve activities like interpreting information, analyzing problems, evaluating evidence, drawing inferences, forming explanations, and self-regulating in the decision-making process (Facione, 1990). In the context of student learning, these skills are needed so that students don't just passively receive information but are able to question sources, compare opinions, identify weaknesses in arguments, and make conclusions based on logical reasoning. That's why

the positive impact of artificial intelligence on critical thinking skills can appear when students use the technology as a tool for exploration, not just as a shortcut to get answers without going through the evaluation process.

The findings of this research support the view (Jia & Tu, 2024) artificial intelligence can have a positive impact on students' learning process by providing quick access to information, early feedback, help in understanding concepts, and support for independent learning activities. Students can use generative artificial intelligence to ask for explanations of difficult concepts, create case examples, get alternative perspectives, make discussion questions, and develop argument frameworks. These uses can help students expand their initial understanding of a topic. However, the benefits of artificial intelligence will be greater if students still evaluate the accuracy of information, the quality of reasoning, the relevance of answers, and the appropriateness of AI outputs with scientifically accountable references.

(Suriano, Plebe, Acciai, & Fabio, 2025) explaining that artificial intelligence can influence the development of critical thinking if students get involved in activities like asking questions, comparing, correcting, and revising the outputs of technology. In this process, students don't just act as information receivers, but as active evaluators who decide whether the answers produced are acceptable, need to be improved, or should be rejected. These activities encourage students to analyze, evaluate, and build arguments. Along with that, (Banegas, Tur, & Tierno, 2024) emphasizing that artificial intelligence in education should be aimed at developing the ability to question information, check evidence, and build logical arguments. That way, artificial intelligence can become a learning stimulus that encourages higher-order thinking activities if its use is designed actively, reflectively, and problem-based.

The results of this research also align with (Rusandi, Ahman, Saripah, Khairun, & Mutmainnah, 2023; Hulmi & Apriadi, 2025; Dibek, Kursad, & Erdogan, 2025), This shows that artificial intelligence can have a positive impact on higher-order thinking skills if used in activities like problem-solving, reflection, evaluating information, and evidence-based discussions. AI can help students quickly gather initial information, simplify complex concepts, provide illustrations, offer alternative answers, and assist in structuring the first draft of a piece of writing. However, these benefits are highly influenced by the teaching design implemented by lecturers. If students are only given tasks to produce the final answer, AI is likely to be used passively. On the other hand, if students are asked to compare AI outputs with journal articles, find errors, identify biases, develop critiques, and improve answers based on scientific evidence, AI can have a much stronger impact on the critical thinking process.

(Mayasari, Sastraatmadja, Suparman, Mutiara, & Maqfirah, 2024; Vieriu & Petrea, 2025) It also shows that artificial intelligence can support self-evaluation and independent learning if its use is accompanied by AI literacy, academic supervision, and an understanding of the technology's limitations. Students can use AI to get an initial overview of the material, create writing outlines, formulate research questions, find examples of concept applications, or get early feedback on ideas they are developing. However, students still need to assess whether the information obtained is scientifically grounded, appropriate for the learning context, relevant to the problem, and verifiable through credible sources. The ability to perform this verification is an important part of critical thinking because AI outputs can contain factual errors, incomplete information,

biases, generalizations, or references that cannot be traced (Daulay, Asna, & and Br Tarigan, 2026).

Even though the research results show a positive and significant effect, this finding doesn't mean that all forms of using artificial intelligence always improve critical thinking skills. Relying too much on AI without a verification process can reduce students' engagement in independent reasoning. (Ekowijayanto & Ulvia, 2025; Suryanto, et al., 2025) shows that heavy reliance on artificial intelligence can have a negative impact on critical thinking, especially when students take answers at face value without checking the sources, reasoning, accuracy of the content, and how well the answer fits the context of the problem. (Gerlich, 2025) also pointed out that excessive use of technology can trigger cognitive offloading, which is the tendency of individuals to hand over some of their thinking processes to digital devices.

Active use of artificial intelligence is different from dependent use of artificial intelligence. Active use is marked by activities like asking questions, checking sources, comparing perspectives, correcting mistakes, making critiques, and reflecting on AI outputs. On the other hand, dependent use is marked by a tendency to accept answers directly, copy technology outputs without processing them, and leave the analysis process to the system. (Malik, et al., 2023; Jasmadia, Saddamb, & Lasri, 2024) explaining that artificial intelligence can help students in the stages of problem identification, information searching, evidence processing, and conclusion drawing. However, artificial intelligence cannot replace human judgment in determining the truth, relevance, feasibility, and ethical value of an answer.

In the context of students in the Islamic Guidance and Counseling Study Program, the influence of artificial intelligence on critical thinking has a more specific meaning. BPI students are prepared to understand individual, family, social, psychological, and religious issues in an empathetic, objective, ethical way, and based on Islamic values. It's not enough for students just to have the ability to gather information; they also need to understand the context of individuals' lives, consider social and cultural conditions, maintain confidentiality, and come up with responsible solutions. Artificial intelligence can help students get the basic concepts, case examples, and alternative perspectives. However, AI cannot replace human sensitivity in understanding experiences, emotions, backgrounds, needs, and the unique conditions of individuals who need guidance and counseling services.

The use of artificial intelligence in BPI learning also needs to pay attention to professional ethics and data protection. Students need guidance so they don't input personal data, counselor information, or sensitive issues into AI platforms without proper protection. Students also need to understand that AI outputs can contain bias, generalizations, unsuitable recommendations, or information that isn't strongly backed by science. Therefore, critical thinking skills when using AI should include the ability to verify information, recognize technological limitations, consider ethical impacts, and connect responses with Islamic values and the principles of guidance and counseling professionalism (Walter, 2024; Sharab, Butul, & Guha, 2024).

Analysis based on the cohort shows that the impact of using artificial intelligence on critical thinking skills is greater for students from the 2022 cohort compared to those from the 2025 cohort. For 2022 students, the R^2 value of 0.243 indicates that artificial intelligence contributes to 24.3% of the variation in critical thinking skills. Meanwhile,

for 2025 students, the R^2 value of 0.104 shows that artificial intelligence contributes 10.4% to the variation in critical thinking skills. Both groups show a positive and significant effect, but the impact of using artificial intelligence tends to be bigger for the 2022 cohort.

The difference in the impact of this influence can be linked to the longer academic experience of the 2022 batch students. Students in this batch have probably faced more analytical tasks, academic writing, case discussions, report preparation, academic presentations, and learning activities that require using artificial intelligence in a more targeted way. This experience can make students better able to use artificial intelligence to deepen analysis, check arguments, and come up with solutions to academic problems. On the other hand, 2025 students are still in the process of adapting to academic culture, scientific literacy demands, and using artificial intelligence critically and ethically. In the early stages of college, AI might be used more for understanding basic material or completing initial assignments, so its impact on critical thinking isn't as significant as for students with more academic experience.

However, the difference in values (R^2) between the two cohorts only shows a tendency of differences in the magnitude of influence. This study has not conducted specific statistical tests to prove that the impact of artificial intelligence on students from the 2022 and 2025 cohorts is significantly different. Therefore, future research can use moderation analysis, tests of differences in regression coefficients, or multi-group regression to examine the role of cohorts as a differentiating variable. The next study could also include AI literacy, information literacy, learning motivation, academic experience, and learning independence as moderator or mediator variables to explain factors that could strengthen or weaken the influence of artificial intelligence on students' critical thinking skills.

Practically, this research shows that BPI lecturers need to integrate artificial intelligence through learning design that focuses on the thinking process, not just task completion. Students can be given assignments to compare AI outputs with journal articles, identify errors or biases, critique AI recommendations, create personal reflections, and present the reasoning behind their academic decisions. Lecturers can also use case studies from guidance and counseling, then ask students to evaluate whether AI responses align with the principles of empathy, confidentiality, professional ethics, and Islamic values. This strategy can help students use AI productively while maintaining independent thinking, academic integrity, and professional responsibility.

So, the results of this study show that artificial intelligence has positive potential to impact the critical thinking skills of BPI students at the State Islamic University of North Sumatra. However, this positive influence doesn't come solely from the technology itself; it's also affected by how well AI is used, the students' information literacy, their ability to evaluate sources, the way lecturers design learning, and students' habits in verifying and reflecting. AI should be seen as a learning aid that broadens exploration and analysis, not as a replacement for thinking, ethical consideration, and students' professional responsibility.

Conclusion

This study concludes that the use of artificial intelligence has a positive and significant effect on the critical thinking skills of students in the Islamic Guidance and Counseling Study Program at the State Islamic University of North Sumatra. This is shown by a regression coefficient of 0.526, a significance value of 0.000, and a determination

coefficient of 0.347. In other words, the use of artificial intelligence contributes to 34.7% of the students' critical thinking skills. The influence of artificial intelligence was also found among students from the 2022 and 2025 batches, but its contribution was greater among the 2022 batch. Artificial intelligence can support critical thinking if it's used to look for information, compare perspectives, evaluate answers, and build arguments. Therefore, lecturers need to integrate AI into learning in a critical, reflective, and ethical way. Future research is suggested to involve a wider range of respondents and to test other factors, like AI literacy, learning motivation, and learning independence.

REFERENCES

Alam, R., & Mosallami, S. A. (2024). The impact of Artificial Intelligence on Critical Thinking, Social Development, and Creative Thinking of Fourth Grade Elementary School Students in Science Lesson. *Trends and Achievements in Learning Technology*, 1(4), 15-34. doi:<https://doi.org/10.22034/JLT.2025.2052201.1026>

Aprianto, I., Sofyan, Rahmawati, S., & Sufyadi, S. (2025). Artificial intelligence and its effects on critical thinking and problem-solving abilities in higher education. *Indonesian Journal of Educational Development (IJED)*, 6(3), 704–719. doi:<https://doi.org/10.59672/ijed.v6i3.5030>

Banegas, N. C., Tur, A. M., & Tierno, N. R. (2024). Challenging critical thinking in education: new paradigms of artificial intelligence. *Cogent Education*, 11(1), 2437899. doi:<https://doi.org/10.1080/2331186X.2024.2437899>

Creswell, J. W. (2024). *Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.)*. Thousand Oaks: Sage Publications.

Daulay, A. A., Asna, A., & and Br Tarigan, D. E. (2026). Determinants of Critical Thinking in the AI Era: The Mediating Role of Self-Efficacy in Digital Literacy and Students' Social Interaction. *Buletin Konseling Inovatif*, 6(1), 44-53. doi:<https://doi.org/10.17977/2797-9954.1040>

Dibek, M. I., Kursad, M. S., & Erdogan, T. (2025). Influence of artificial intelligence tools on higher order thinking skills: a meta-analysis. *Interactive Learning Environments*, 33(3), 2216-2238. doi:<https://doi.org/10.1080/10494820.2024.2402028>

Ekowijayanto, M., & Ulvia, A. L. (2025). Impact of ChatGPT on Students' Learning Strategies and Critical Thinking Development. *Journal of Innovation in Educational and Cultural Research*, 6(4), 1-16. doi:<https://doi.org/10.46843/jiecr.v6i4.2400>

Facione, P. A. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction*. Millbrae: The California Academic Press.

Field, A. (2018). *Discovering statistics using IBM SPSS statistics (5th ed.)*. London, England: SAGE Publications.

Gerlich, M. (2025). AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking. *Societies*, 15(1), 16-27. doi:<https://doi.org/10.3390/soc15010006>

- Ghozali, I. (2021). *Aplikasi analisis multivariate dengan program IBM SPSS 26 (10th ed.)*. Semarang, Indonesia: Badan Penerbit Universitas Diponegoro.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis (8th ed.)*. Andover, England: Cengage Learning.
- Hassen, M. Z. (2025). The Impact of AI on Students' Reading, Critical Thinking, and Problem-Solving Skills. *Published in American Journal of Education and Information Technology*, 9(2), 82-90. doi:10.11648/j.ajeit.20250902.12
- Hulmi, Z. A., & Apriadi, E. A. (2025). Analysis of the Effect of Using Artificial Intelligence on Critical Thinking Power of Students in the Digital Age. *International Journal of Technology and Computer Science*, 1(1), 38–50. doi:https://doi.org/10.58290/ijtcs.v1i1.107
- Jasmadia, Saddamb, & Lasri. (2024). Critical thinking: An analytical study on the impact of Artificial Intelligence (AI) usage on students at Al Washliyah Darussalam University, Banda Aceh. *Sekumpul: Journal of Multidisciplinary Education Sciences*, 2(1), 25–32. doi:https://doi.org/10.62568/jomes.v2i1.168
- Jia, X.-H., & Tu, J.-C. (2024). Towards a New Conceptual Model of AI-Enhanced Learning for College Students: The Roles of Artificial Intelligence Capabilities, General Self-Efficacy, Learning Motivation, and Critical Thinking Awareness. *Systems*, 12(3), 74. doi:https://doi.org/10.3390/systems12030074
- Likert, R. (1932). *A technique for the measurement of attitudes*. Archives of Psychology. Princeton: Psychological Corporation.
- Liu, W., & Wang, Y. (2024). The Effects of Using AI Tools on Critical Thinking in English Literature Classes Among EFL Learners: An Intervention Study. *European Journal of Education*, 59(4), e12804. doi:https://doi.org/10.1111/ejed.12804
- Malik, A. R., Pratiwi, Y., Andajani, K., Numertayasa, I. W., Suharti, S., Darwis, A., & Marzuki. (2023). Exploring Artificial Intelligence in Academic Essay: Higher Education Student's Perspective. *International Journal of Educational Research Open*, 5(1), 100296. doi:https://doi.org/10.1016/j.ijedro.2023.100296
- Mawaddah, N. N., Agustina, D. R., Amalia, N. S., Raharjo, I. T., & Amin, F. C. (2025). Analisis Pemanfaatan Kecerdasan Buatan (AI) Terhadap Berpikir Kritis Mahasiswa Fakultas Dakwah dan Ilmu Komunikasi UIN Syarif Hidayatullah Jakarta. *Jurnal Ilmu Komunikasi Dan Sosial Politik*, 2(4), 1177–1184. Retrieved from https://jurnal.ittc.web.id/index.php/jiksp/article/view/2799
- Mayasari, N., Sastraatmadja, A. H., Suparman, T., Mutiara, I., & Maqfirah, P. A.-V. (2024). Effectiveness of Using Artificial Intelligence Learning Tools and Customized Curriculum on Improving Students' Critical Thinking Skills in Indonesia. *The Eastasouth Journal of Learning and Educations*, 2(2), 111–118. doi:https://doi.org/10.58812/esle.v2i02.30

Misrah, & Hambali, M. (2024). PEMAHAMAN DAN IMPLEMENTASI KEMAMPUAN KONSELING BERBASIS KOMUNITAS MAHASISWA BPI UIN SU MEDAN. *JURNAL ILMIAH EDUNOMIKA*, 8(1), 1-14. doi:<https://doi.org/10.29040/jie.v8i1.12238>

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory (3rd ed.)*. New York: McGraw-Hill.

Rojas, L. I., Ullauri, L. S., & Vargas, P. A. (2024). Collaborative Working and Critical Thinking: Adoption of Generative Artificial Intelligence Tools in Higher Education. *Sustainability*, 16(13), 5367. doi:<https://doi.org/10.3390/su16135367>

Rusandi, M. A., Ahman, Saripah, I., Khairun, D. Y., & Mutmainnah. (2023). No worries with ChatGPT: building bridges between artificial intelligence and education with critical thinking soft skills. *Journal of Public Health*, 45(3), e602–e603. doi:<https://doi.org/10.1093/pubmed/fdad049>

Shahzad, S. A., Raza, M. M., Malhi, S. D., Ain, Q. u., & Malhi, D. K. (2025). Integrating Artificial Intelligence To Foster Critical Thinking And Problem-Solving In 21st-Century Classrooms. *Research Journal for Social Affairs*, 3(5), 635-648. doi:<https://doi.org/10.71317/RJSA.003.05.0362>

Sharab, L., Butul, B., & Guha, U. (2024). Integrating Critical thinking and embracing Artificial Intelligence: Dual Pillars for advancing dental education. *The Saudi Dental Journal*, 36(12), 1660-1667. doi:<https://doi.org/10.1016/j.sdentj.2024.11.004>

Sugiyono. (2024). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Bandung: Alfabeta.

Suriano, R., Plebe, A., Acciai, A., & Fabio, R. A. (2025). Student interaction with ChatGPT can promote complex critical thinking skills. *Learning and Instruction*, 95(1), 102011. doi:<https://doi.org/10.1016/j.learninstruc.2024.102011>

Suryanto, A. F., Wajdi, M., Sahoo, P. K., Wu, Q., Yusof, N. M., & Chan, Y. F. (2025). The impact of artificial intelligence on logic skills, critical thinking, and student creativity. *Journal of Language, Literature, Social and Cultural Studies*, 3(3), 283–299. doi:<https://doi.org/10.58881/jllscs.v3i3.407>

Vieriu, A. M., & Petrea, G. (2025). The Impact of Artificial Intelligence (AI) on Students' Academic Development. *Education Sciences*, 15(3), 343. doi:<https://doi.org/10.3390/educsci15030343>

Walter, Y. (2024). Embracing the future of Artificial Intelligence in the classroom: the relevance of AI literacy, prompt engineering, and critical thinking in modern education. *International Journal of Educational Technology in Higher Education*, 21(15), 1-29. doi:<https://doi.org/10.1186/s41239-024-00448-3>

Zuhairi, A., & Iskandar, T. (2026). The Contribution of Artificial Intelligence in Enhancing Students' Speaking Quality: An Analysis of Thinking Patterns and Rhetorical

Skills. *JUTEK: Jurnal Teknologi*, 2(2), 48-54. Retrieved from <https://e-journalbattuta.ac.id/index.php/jutek/article/view/118>