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# THE ROLE OF ARTIFICIAL INTELLIGENCE (AI) ON CRITICAL THINKING SKILLS IN A CASE STUDY OF STUDENTS OF THE FACULTY OF ECONOMICS AND BUSINESS (FEB) OF UNIVERSITAS SINGAPERBANGSA KARAWANG

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**Abstract:** *The current generation, which is living and familiar with information technology in their daily lives, including but not limited to learning purposes, can use artificial intelligence (AI) technology as a learning tool. Meanwhile, they face the task of learning 21st century skills that need higher order thinking (HOTS). Their reliance on the ease of AI makes students dependent, which of course has an impact on reducing students' critical thinking skills. This study looked at how AI affects pupils' critical thinking skills. This study employs quantitative approaches, with questionnaires serving as research instruments, and is analyzed using basic linear regression. This research was conducted on students from the faculty of economics and business, University of Singaperbangsa Karawang. The research results show that AI has a positive and significant effect on students' critical thinking skills by 11.2%. Then the appropriate use of AI can be a medium to improve students' critical thinking skills.*

**Keywords:** *Artificial Intelligence, Critical Thinking, Student.*

## INTRODUCTION

The development of technological innovation is a process that is in line with the progress of human civilization. Technology plays an important role in helping human activities, including the teaching and learning process. Technological innovations created by humans have developed in an unprecedented form. This development has affected many aspects of people's lives, especially in Society 5.0, a society that coexists with smart and sophisticated technology.

Artificial intelligence (AI) is one of the results of a technological innovation in the era of the industrial revolution. Artificial intelligence (AI) is the ability of machines to adapt to new situations, handle emerging situations, solve problems, answer questions, plan devices and perform various other functions that require some level of intelligence that is usually present in humans. AI is a term derived from industrial society 4.0 and society 5.0 which is a computer program, machine learning, hardware and software. AI is a branch of science that enables machines to perform tasks and functions that humans can perform.

Artificial Intelligence (AI) has brought great changes in life including education. It is demonstrated by the increased efficiency of the education process, advancement of global learning, personalization of learning, production of smarter content, and optimization of education management in terms of efficacy and efficiency (Manurung et al., 2023). Examples of some AIs that support student assignments such as Chat GPT, Canva, Slides Go, Grammarly, Paraphrase, Google Meet, Zoom, and many more.

However, the digital familiarity possessed by current students does not indicate a high ability in terms of learning skills, especially critical thinking skills (CT skills) (Katoningsih & Sunaryo, 2020). Critical thinking is one of the higher order thinking skills required in the development of 21st century skills. Critical thinking skills are the

ability to process and evaluate information objectively, to be able to determine appropriate and effective decisions (Miterianifa et al., 2021). In education, critical thinking skills are essential skills that must be mastered by students. Students who have this skill tend to be able to master the concepts and problems presented in learning, and are able to implement these concepts in real-life situations.

CT skills are part of higher-order thinking skills (HOTS), which are still ranked relatively low in the Program for International Student Assessment (PISA) (Katoningsih & Sunaryo, 2020). The various conveniences offered by AI make students dependent, this of course has an impact on reducing the critical thinking skills possessed by students. This statement is in line with the results of research conducted by (Akastangga et al., 2023) that based on the results of the study, there are indications of dependence on the use of ChatGPT which has an unfavorable effect on the critical thinking skills of UIN Sunan Kalijaga students.

This is in accordance with the data showing a decrease in critical thinking skills, before using ChatGPT by 3.52% and after using ChatGPT by 3.22%. Therefore, the use of AI must be accompanied by adequate mastery of critical thinking skills. In addition to overcoming this dependence, this aims to make the use of AI among students productive and appropriate. In effectiveness theory, effective technology is a system that can provide added value or positive influence on user behavior (Sahfitri, 2012). However, it is different from the research conducted by (Manurung et al., 2023) that In the use of this AI, the ability to draw conclusions will increase due to search results that have been narrowed and adjusted in more detail related to the questions that will be asked to AI.

The rapid advancement of Artificial Intelligence (AI) has significantly transformed the landscape of higher education. In particular, the integration of AI into teaching and learning processes has opened new avenues for developing essential 21st-century skills, such as critical thinking. Critical thinking is a vital competency for students in the Faculty of Economics and Business (FEB), as it enables them to analyze complex problems, make informed decisions, and adapt to the dynamic demands of the business world (Esparrago, 2021). This theoretical framework explores how AI can influence and enhance the critical thinking skills of FEB students at Universitas Singaperbangsa Karawang (Unsika).

The quality of a nation's human resources, especially students who rely on education, determines its progress. Education enables students to study well and reach their full potential. To improve students' critical thinking skills, it is necessary to innovate in the world of education, especially in terms of learning. The utilize of data and communication innovation itself can make strides understudy accomplishment and cognitive capacities.

With the rapid development of technology, we need to understand its impact on various aspects of life, one of which is education. This research aims to examine the influence of AI on students' critical thinking skills, particularly whether the use of AI supports or hinders students' ability to think critically in learning activities.

Through this research, we hope to provide empirical evidence regarding the positive or negative implications of AI usage in academic settings, particularly for students in higher education. By doing so, this study contributes to the growing discourse on the integration of AI in education, and provides input for educators, policymakers, and technology developers to create a more balanced, responsible, and effective learning environment. Additionally, the findings of this research can serve as a reference for further studies that examine student behavior and learning outcomes in relation to the increasing presence of AI in daily academic activities

Therefore, this research aims to determine the effectiveness and influence of AI on students' critical thinking abilities. The urgency of this research is important as a form of attention to rapidly developing technology and as an update to previous research. This is considering that the amount of research on AI is still limited, it is hoped that this research can provide benefits for education observer. Apart from that, this research provides benefits for technology observers find out how widespread the impact of AI is on students' critical thinking abilities in Indonesia, especially Unsika. FEB Unsika students became research subjects because based on data, Feb Unsika students became active users of AI.

## RESEARCH METHODOLOGY

This research uses a quantitative approach. According to (Sugiyono, 2013), quantitative research is research that tries to explain a situation by collecting data in the form of numbers which are analyzed using certain statistical-based methods. The regression analysis method was applied in this study. The method is one way to describe the relationship between the dependent variable and the independent variable. The relationship between variables will be known so as to produce accurate predictions.

The object raised in this study is the role of AI on the thinking ability of students of the Faculty of Economics and Business, University of Singaperbangsa Karawang. There are two types of variables raised in this study, namely the use of AI and students' critical thinking skills. There are independent and dependent variables from both variables in question. The independent variable is the use of AI and the dependent variable is the ability to think is the ability to think critically in students of the Faculty of Economics and Business, University of Singaperbangsa Karawang.

This method also serves to determine the development of AI which will be widely used in the future. The

benefits of applying this method are that it can clarify the description of variables that affect something to be studied, establish the relationship between certain variables, and test short-term conjectures that arise during research. Regression analysis can provide predictive calculations of the mean value of the dependent variable based on the value of the independent variable.

### Artificial Intelligence (AI)

AI technologies, such as intelligent tutoring systems, adaptive learning platforms, and natural language processing tools, have the potential to facilitate the development of critical thinking skills among students. These technologies provide personalized learning experiences, immediate feedback, and opportunities for self-directed exploration, all of which are conducive to fostering critical thinking (Holmes et al., 2019). For example, AI-powered platforms can present students with real-world business scenarios, encourage them to analyze data, and guide them through the process of evaluating alternative solutions. This interactive and adaptive approach helps students to not only acquire knowledge but also to apply it critically in various contexts (Luckin et al., 2016).

One of the core components of critical thinking is the ability to analyze information, evaluate arguments, and reflect on one's own reasoning. AI, particularly in the form of advanced language models like ChatGPT, can support these processes by engaging students in meaningful dialogues, posing challenging questions, and offering diverse perspectives (Zawacki-Richter et al., 2019). Through interactions with AI, students are encouraged to justify their opinions, consider counterarguments, and refine their reasoning. This iterative process of questioning and reflection is essential for deepening critical thinking skills (Fischer et al., 2013).

AI's capacity for personalization is a key advantage in supporting critical thinking development. By analyzing students' learning patterns, strengths, and weaknesses, AI systems can tailor content and activities to meet individual needs (Holmes et al., 2019). For instance, students who struggle with logical reasoning can receive targeted exercises, while those who excel can be challenged with more complex problems. This adaptive approach ensures that all students are appropriately challenged and supported, maximizing their potential for critical thinking growth (Luckin et al., 2016).

Artificial intelligence (AI) is the ability of machines to adapt to new situations, handle emerging situations, solve problems, answer questions, plan devices and perform various other functions that require some level of intelligence that is usually present in humans (Soori et al., 2023). AI is a term derived from industrial society 4.0 and society 5.0 which is a computer program, machine learning, hardware and software. AI is a branch of science that enables machines to perform tasks and functions that humans can perform (Chen et al., 2020).

Artificial intelligence (AI) indicators in this study use the TAM (Technology Acceptable Model) approach. TAM is a model that is widely used to examine research on the acceptance of a technology. TAM analyzes the perceived benefits and ease of users in accessing a technology (Rahmawati & Narsa, 2019). The indicators of Artificial intelligence (AI) with the TAM approach in this study can be seen in the following table.

**Table 1 Artificial Intelligence Indicators with TAM approach**

No	Indikator	Indicator Description
1	<i>Perceived Usefulness</i> (PU)	Perceptions that describe the extent to which the system can provide confidence to users in providing benefits to their work.
2	<i>Perceived Ease of Use</i> (PEU)	Perceptions indicating that users believe the system is easy to understand, use, and does not require special training to operate.
3	<i>Content Quality</i>	Content quality of a technology system

*Source: Data adapted from Laora, 2021*

### Critical Thinking

The successful integration of AI in fostering critical thinking depends largely on the role of educators. Teachers must act as facilitators who guide students in using AI tools effectively and ethically. This includes teaching students how to critically assess the information provided by AI, encouraging them to ask probing questions, and fostering a

classroom culture that values curiosity and skepticism (Holmes et al., 2019). By combining the strengths of AI with human guidance, educators can create a balanced learning environment that promotes both technological literacy and critical thinking.

However, ongoing evaluation and adaptation are necessary to ensure that AI tools are used to support, rather than replace, the development of independent critical thinking. Future research should continue to explore best practices for integrating AI in higher education, with a focus on maximizing its benefits while mitigating potential drawbacks.

Critical thinking skills are the ability to process and evaluate information objectively, in order to make appropriate and effective decisions. Every individual needs critical thinking skills to successfully solve problems in difficult situations. Everyone needs to analyze and evaluate situations and conditions to make important decisions (Papathanasiou et al., 2014). Skills in critical thinking are not abilities that are outwardly present in humans from birth, so these abilities can be applied, trained, and developed through the learning process (Khan et al., 2023). Indicators of critical thinking skills used in this study can be seen in Table 2.

**Table 2. Indicators of Critical Thinking Dimensions**

No	Indikator	Indicator Description
1	Interpretation	Understand the problem which is shown by writing what is known and what is asked about the problem correctly.
2	Analysis	Identify relationships between statements, questions, concepts given in the problem shown by making mathematical models appropriately and giving appropriate explanations.
3	Evaluation	Using the right strategy in solving the problem, complete and correct in performing calculations
4	Inference	Can draw conclusions from what is asked correctly

*Source: Data adapted from Faiziyah, 2022*

### Research design

The strategy chosen in this AI usage research is quantitative measured research. This quantitative research methodology is based on positivism and uses numerical data. This methodology based on positivism is a scientific methodology because it adheres to the three principles of science, namely concrete, objective, and scientific (Sugiyono, 2013). This approach is known as the scientific method because it follows its principles, which are systematic, concrete, objective, measurable, and concrete. Using the use of AI as the independent variable and students critical thinking capacity in FEB Unsika students as the dependent variable, this study sought to identify direct and indirect relationships between variables. This research design considers the research population and sample, research variables, types and sources of data, data collection techniques, validity and reliability of research instruments, and data analysis.

### Population and Sample

The participants in this study were students from the Faculty of Economics and Business at the University of Singaperbangsa Karawang who used artificial intelligence (AI) technology. A population is a generalized collection of participants who share specific characteristics determined by the researcher. The total population in this study was 1.566 people. The sampling method used is simple random sampling, namely sampling directly from the total population randomly using the Solvin formula, so that the sample in this study is obtained as many as 98 FEB Unsika students.

## Data Collection

Data was collected mostly by a survey method, with a study instrument in the form of a questionnaire. A questionnaire is a data collection technique in which respondents are given a series of questions or written statements to answer. This study questionnaire was created using a Likert scale to assess respondents' impressions of indicators. The replies to each questionnaire item in this study were assessed using a Likert scale. The Likert scale assesses respondents' attitudes, opinions, and viewpoints on research variables. The Likert scale is shown in Table 3 (Palupi et al., 2021).

**Table 3. Likert Scale**

Answer Criteria	Score
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

Source: Data Adapted from Palupi, 2021

The quality of the research instrument was tested by conducting validity and reliability tests. The validity test is carried out to show the extent to which a measuring device can measure what you want to measure. While the reliability test is used to show the consistency of a measurement result. Meanwhile, hypothesis testing was carried out using simple linear regression test techniques. Model testing in this study was carried out using SPSS version 26 software.

## RESULTS AND DISCUSSION

### Result

#### Validity Test

The validity test is carried out to see whether the questions of each indicator we use are valid or not. The validity calculation is carried out as a condition in order to calculate reliability. Data is considered genuine if the estimated R value exceeds the R Table (Hikmah & Muslimah, 2021). Table R count > R table (value of 0,195). The results of the validity test can be seen from the following table.

**Table 4 Result of Validity Test**

Indicator	Result	Description
X.1	0.659	Valid
X.2	0.580	Valid
X.3	0.667	Valid
X.4	0.680	Valid
X.5	0.479	Valid
X.6	0.437	Valid
X.7	0.709	Valid
X.8	0.716	Valid
X.9	0.755	Valid
Y.1	0.768	Valid
Y.2	0.768	Valid
Y.3	0.696	Valid
Y.4	0.809	Valid
Y.5	0.767	Valid

The data is said to be valid if the value of r count > r table and the significance value < 0.05. The data obtained results in an r table value of 0.195, so the spss test results show that all question items are valid. The validity test carried out is the pearson correlation test.

#### Reliability Test

The reliability test determines whether the questionnaire has consistency when the assessment is repeated. If the Cronbach's Alpha value is more than 0.60, the question items in the questionnaire are reliable (Anggraini et al., 2022). If the Cronbach's Alpha value is less than 0.60, the questionnaire items are not reliable.



Reliability Statistics	
Cronbach's Alpha	N of Items
.801	9

**Figure 1 Variable X Test Reliability Results**

The cronbach's alpha value generated from the x variable reliability test is 0.801, meaning that cronbach alpha > 0.60, so the variable X is reliable.

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
X1	31.06	14.963	.574	.770
X2	31.07	15.338	.481	.785
X3	31.89	14.034	.546	.775
X4	31.30	14.556	.586	.773
X5	31.54	15.362	.331	.882
X6	32.16	15.206	.235	.823
X7	32.02	13.333	.580	.769
X8	31.65	13.705	.607	.760
X9	32.29	12.915	.639	.760

**Figure 2 Variable X Test Reliability Results**

The cronbach's alpha value generated from the x variable reliability test is 0.834, meaning that cronbach alpha > 0.60, so the variable Y is also reliable.

This indicates strong internal consistency in both variables, strengthening the credibility of the results. These findings are supported by research from (Manurung et al., 2023), which highlight the reliability of digital tools in assessing cognitive competencies, such as critical thinking in an AI-influenced learning environment.

### Regression Analysis

#### The Regression Equation Model

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.410	1.503		6.422	.000
	AI	.190	.054	.335	3.522	.001

a. Dependent Variable: Critical Thinking

**Figure 3 Table Coefficient**

Based on the spss output above, the regression equation can be written as follows::

$$Y = 12.410 (\alpha) + 0.190 (X) + e$$

The equation model means:

- Constanta ( $\alpha$ ) = 12.410 meaning that if the use of AI is constant or fixed, then the level of critical thinking is 0.190
- Coefficient of regression direction/ $\beta$  (X) = 0.190 (is positive) meaning that if the use of AI increases by one (1) unit, critical thinking will increase by 0.190.

This positive relationship shows that there is a tendency for critical thinking skills to improve as students utilize AI tools in their academic tasks. This aligns with the theory of technological effectiveness, which posits that beneficial technology integration can enhance cognitive learning outcomes (Sahfitri, 2012) Moreover, this finding supports Manurung et al. (2023), who noted improved reasoning abilities with responsible AI use.

### Hypothesis Testing

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.410	1.503		6.422	.000
	AI	.190	.054	.335	3.522	.001

a. Dependent Variable: Critical Thinking

**Figure 4 table coefficient**

- Signifikansi value  $0.000 < 0.05$
- T-count > T-table ( $3.522 > 1.660$ )

Based on the two basic decisions above, it can be concluded that Artificial Intelligence has a positive and significant effect on the critical thinking skills of FEB Unsika students. So H0 is rejected, and H1 is accepted. This result implies that AI use significantly contributes to enhancing students' ability to analyze, evaluate, and synthesize information key elements of critical thinking. This supports Katoningsih & Sunaryo (2020), who stressed the need for intentional integration of digital tools to foster

### Coefficient of Determination

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.335 <sup>a</sup>	.112	.103	2.260

a. Predictors: (Constant), AI

### Figure 5 Table Model Summary

The r square value 11.2% indicates that AI influences critical thinking by 11.2%, with the remaining 88.8% influenced by other variables. The r square value of 11.2% indicates that AI affects critical thinking by 11.2%, with the remaining 88.8% influenced by other factors.

### Discussion

The findings show that the use of Artificial Intelligence (AI) has a positive and significant impact on the critical thinking skills of FEB Unsika students. The regression coefficient of 0.190 indicates a direct relationship between the use of AI and critical thinking, although the effect is not very strong. Hypothesis testing also supports this, as the significance value is 0.000 and the t-count is higher than the t-table, meaning the effect is statistically proven.

Although the R Square value is only 11.2%, it still shows that AI contributes to the development of critical thinking, although most of the influence comes from other factors such as teaching methods, student motivation, and learning environment.

This result is consistent with the theory of technology mediation in learning, where AI helps students to think better-not by replacing human reasoning, but by supporting it. AI can help in analyzing, evaluating, and understanding information more deeply.

This research also highlights the need for planned and purposeful use of AI in education. This research supports the idea that technology should not only facilitate, but also help students think critically and learn actively, as emphasized by (Katoningsih & Sunaryo, 2020) and (Manurung et al., 2023).

## CONCLUSION

Students now regularly incorporate various tools provided by AI into their daily routine. The use of AI has been proven to facilitate the lecture process undertaken by students as proven in one of the statement items in the questionnaire with a percentage of 43.5% of students answering agree, and 51.3% strongly agree. Apart from that, the use of AI has also been proven to increase the efficiency and effectiveness of students in carrying out coursework because students think that AI can provide quite complete information, and using AI is not a difficult matter.

Based on the results of research that has been carried out regarding the analysis of the role of artificial intelligence on critical thinking of FEB Unsika students using a simple linear regression test, it can be concluded that there is a positive and significant influence between AI variables on students' critical thinking abilities. This means that the increase in the use of AI is in line with the increase in students' critical thinking skills.

Students' thinking abilities can be opened widely from various points of view, and can maximize students' thinking abilities effectively and efficiently. As students' thinking abilities increase, there is an increase in formulating the main issues well, and students' thinking patterns become more critical. In using AI, the ability to draw conclusions will increase because the search results have been narrowed and adjusted in more detail regarding the questions that will be asked to the AI. The results of this search are very influential on the user's mindset, the more detailed the results, the broader the results, the more information users receive.

However, this study also has some limitations. First, this study was only conducted within the Faculty of Economics and Business, Singaperbangsa University of Karawang, so the results cannot be generalized to students from other faculties or universities. Second, the study only used a quantitative approach with a questionnaire as the main instrument, without any deeper exploration using qualitative methods such as interviews or focus group discussions. For future research, it is recommended to expand the sample coverage by including students from various disciplines or universities to obtain more comprehensive findings. Future research could also consider a mixed-methods approach to explore more deeply how AI is used in learning and how it shapes students' cognitive processes and critical thinking. In addition, further research could explore other variables that may influence critical thinking, such as motivation, learning strategies, or digital literacy.

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