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The Influence of The Use of Artificial Intelligence (AI) and Digital Literacy on the Critical Thinking Skills of MPLB Students at SMK Negeri 42 Jakarta

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Abstract

This study aims to determine and analyze the effect of artificial intelligence (AI) and digital literacy on the critical thinking skills of MPLB students at SMK Negeri 42 Jakarta. The study was conducted using a quantitative method with a Likert scale questionnaire. The sample was selected using proportional sampling with a population of 144 students and a sample of 106 students. Data management and analysis were conducted using the IBM SPSS Statistics 22 software application, employing multiple linear regression analysis. The results of the data analysis indicate that: (1) the use of artificial intelligence (AI) has an effect on critical thinking skills with a significance level of 0.004 < 0.05; (2) digital literacy influences critical thinking ability with a significance value of 0.000 < 0.05; (3) simultaneously, the use of artificial intelligence (AI) and digital literacy influences critical thinking ability with an R2 value of 37%. The results of this study indicate that the proper and wise use of artificial intelligence can serve as an analytical and reflective tool in facilitating critical thinking processes among students. Digital literacy is an important foundation in shaping students to become analytical, reflective, and capable of facing information challenges. Therefore, support from various parties is needed to help students improve their critical thinking skills in facing the complex technological era.

Keywords: *critical thinking skills, digital literacy, use of artificial intelligence, students, vocational high school*

INTRODUCTION

Education fosters cognitive, affective, and conative development, thereby creating reliable human resources. Education not only promotes science and knowledge but can also be used to shape a person's character, resulting in individuals with self-awareness and wisdom. Over the past two decades, there has been a significant shift in the direction of global education development, with a focus on the use of Information and Communication Technology (ICT) as the primary strategy in 21st-century education management. The changing educational patterns evident today are characteristic of the Era of Openness, Science, and Technology, which are evolving as evidence of this shift. This era is referred to as the 21st century, emphasizing the creation of quality human resources. Education is one of the fields undergoing fundamental changes in this century (Hasibuan & Prastowo, 2019). In 21st-century education, the focus is on integrating literacy skills, knowledge mastery, skills, attitudes, and technological expertise.

Based on data from the Ministry of Education, Culture, Research, and Technology in 2021, vocational high schools have become the choice of the community for continuing education. Survey results show that 82.05 percent of respondents are interested in continuing their education at vocational high schools, with factors of interest including job prospects and a variety of majors. Vocational education in the 21st century emphasizes life and career skills, learning and innovation skills, and information media and technology skills (Cigerci, F.M, 2020; Nuryanto,A. & Eryandi, K.Y, 2020). Dwijonagoro et al (2019) The expected objectives of SMK in the scientific learning approach with the characteristic of student-centered learning through Technology Pedagogical Content Knowledge and Higher Order Thinking Skills have not been achieved.

The findings of the 2024 Education Integrity Assessment Survey (SPI), released by the Corruption Eradication Commission (KPK), should be a cause for concern for all. The survey,

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which involved 449,865 respondents, including students, parents, educators, and school principals, revealed that academic integrity data a component of the SPI Indonesia 2024 integrity assessment shows that cheating remains prevalent in 78% of schools and 98% of universities among respondents. This indicates that cheating is still prevalent in most schools and universities. Plagiarism was found to occur in 43% of universities and 6% of schools. Critical thinking is a key focus in the shift toward Student-Based Learning (SBL) across all levels of education, from elementary school to higher education. Students are required to develop their thinking through literature studies and discussions. Therefore, students need to be prepared to analyze, evaluate the accuracy of information, and assess the credibility of information sources. This specific skill is called information literacy to avoid plagiarism, enabling students to engage their thinking when rewriting answers (Wahyuni, 2019). The 2022 PISA results indicate that Indonesia's ranking has improved by 5–6 positions compared to the 2018 PISA, but the absolute scores have decreased in all three domains: reading, mathematics, and science. This indicates that Indonesian students have not yet reached the minimum proficiency level (Level 2) in all three domains, highlighting challenges in critical thinking skills (Kemendikbudristek, 2023). According to the World Economic Forum (2020), critical thinking ranks second among the top ten skills needed in the future. This skill is highly beneficial in filtering relevant and significant information to include in their writing (Magvira & Nensilianti, 2025).

In terms of technological development, artificial intelligence (AI) has become one of the most popular technologies today, providing a variety of applications and tools to support learning. Data from the World Economic Forum (2020) ranks artificial intelligence eighth in predictions of technologies that will be adopted by organizations in 2023-2027, with a percentage of 74.9%. This presents both opportunities and challenges for Indonesia in terms of creating a workforce ready to compete globally (Kementerian Pendidikan dan Kebudayaan, 2024). Surveys by Tirto and Jakpat indicate that 30.45% of students use AI in the “very frequently” category (at least once a week). Respondents utilize AI for summarizing articles or journals, creating papers, writing essays, gathering information, and translating texts (Hartanto & Rohmah, 2024). The presence of AI in the education sector has a significant impact on improving the quality of learning, particularly in developing students' critical thinking skills.

In addition, along with technological developments, digital literacy has also developed as one of the learning needs of the 21st century, which requires the use of technology as a teaching and learning medium in developing learning skills. Based on the 2023 Digital Literacy Status Report in Indonesia, the Ministry of Communication and Information Technology (Kominfo) in collaboration with Katadata Insight Center (KIC) shows that the digital literacy index of Indonesia in 2023, on a scale of 1 to 5, stands at 3.65, which is classified as “high.” The measurement of the digital literacy index was conducted across four major indicator pillars: digital skills, digital safety, digital ethics, and digital culture. Among the high-category results, the digital skills aspect saw a decrease in score from 3.52 in 2022 to 3.50 in 2023 (Annur, 2023). This pillar measures the use of computers/mobile phones, uploading/downloading data, verifying information sourced from the internet, and other capabilities of internet users. The significant impact of digital literacy on the development of critical thinking among students includes increasing access to information, as it encourages students to explore information from various sources. It is important to strengthen students' digital literacy, as this is closely related to their critical thinking abilities in the current era of technological advancement.

Based on the preliminary research conducted by the researcher in class X of SMK Negeri 42 Jakarta, it was found that only 25.71% of students asked critical questions when they did not understand the material. Additionally, only 42.86% actively expressed their opinions or responded to teachers/peers during learning/discussions in class, and 54% of students experienced difficulties in analyzing problems presented in the learning process. These findings indicate that students' critical thinking skills are still relatively low, particularly in terms of analysis and active participation. According to Facione (1990), critical thinking skills encompass

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the abilities of interpretation, analysis, evaluation, inference, and explanation, which are used reflectively to make logical and reasoned decisions. The low level of critical thinking skills is also reflected in the high level of passive behavior among students in the learning process and their tendency to simply accept information without evaluating or questioning it in depth. This poses a challenge in the digital age, where students are expected to be more independent, critical, and adaptable to rapidly evolving information.

Low critical thinking skills are caused by a number of factors, one of which is that students do not understand concepts, making it difficult for them to solve problems that require analysis, manipulation, and strategy (Az et al., 2023). Additionally, there are several factors that influence critical thinking skills, including physical condition, intellectual development, and motivation (Rosmaini, 2023) lack of self-confidence, limited exploration opportunities, teaching methods, and classroom environment (Berjamai & Davidi, 2020); elementary clarification, basic support, inferring, advanced clarification, strategies, and tactics (Suciono et al., 2021); use of AI (Cholvistaria et al., 2025); physical condition, habits, motivation, anxiety, consistency, intellectual development, feelings, experience (Sutriyanti & Mulyadi, 2019); digital literacy skills (Husaeni et al., 2023).

In further preliminary research conducted to identify the factors underlying critical thinking among MPLB students at SMK Negeri 42 Jakarta, it was found that out of the five factors tested—use of artificial intelligence, digital literacy, collaboration, digital learning environment, and learning motivation—two factors significantly contributed to the lack of critical thinking skills among students: the use of AI (48.57%) and digital literacy (42.85%). Critical thinking, which should be a key focus of education, is increasingly declining due to the emergence of AI. In the long term, AI harms the development of students' critical thinking skills and creates problems in accurately assessing academic abilities. Digital literacy is based on the principle of helping individuals access information without the barriers of distance and time, through digital devices such as smartphones and computers with internet access. The significant impact of digital literacy on the development of students' critical thinking includes enriching information by encouraging students to explore information from various sources.

Several studies have addressed similar topics, but further exploration of specific aspects related to the specific context of this issue is still needed. Nafil et al (2024) focused on how the use of AI affects critical thinking skills in university students. Additionally, Zabeta & Sholeha (2025) discussed the impact of AI on critical thinking skills in students. Zaini et al., (2025) researched the integration of artificial intelligence (AI) in learning, as well as the impact of digital literacy and critical thinking skills focused on students at the Sabilal Muhtadin NW Lopok Islamic Boarding School Foundation with core subjects such as Mathematics, Indonesian Language, and Social Sciences. Additionally, Putri (2025) focuses on the influence of AI and digital literacy on critical thinking skills among Economics Education students at Jambi University, Class of 2023. Meanwhile, Walter (2024) investigates the transformative impact of Artificial Intelligence (AI) in educational settings, with a focus on the need for AI literacy, rapid skill acquisition techniques, and the enhancement of critical thinking skills tailored to educational needs, including those of students with special needs.

Previous studies have not examined the more specific and relevant dynamics at the educational level focused on in this research. There is a gap in previous research exploring how the use of AI and digital literacy influences critical thinking skills at the vocational high school level. Additionally, this research has strong relevance to the current dynamics in the transformation of the educational world. Curriculum, technological developments, and future demands can provide new perspectives on the influence of AI and digital literacy on students' critical thinking skills. Thus, it is hoped that this study can contribute and provide an actual view of these factors. This study aims to determine and analyze the influence of artificial intelligence and digital literacy on the critical thinking skills of MPLB students at SMK Negeri 42 Jakarta.

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RESEARCH METHODS

A data-based approach using multiple regression analysis was used in this study. This method led to hypothesis testing in accordance with the previous formulation to obtain objective and measurable conclusions. The population in this study consisted of 142 students in grades X and XI majoring in Office Management and Business Services at SMK Negeri 42 Jakarta. This study used proportional sampling or balanced sampling. This approach was used to take samples from each group or category in appropriate sizes so that the samples could represent the characteristics of the entire population. The number of samples obtained from grade X was 52 students, while grade XI was 54 students, bringing the total sample to 106 students.

A quantitative research method was used in this study, employing primary data. Data was collected through the distribution of questionnaires to research subjects. The questionnaires were administered in the form of a series of written questions or statements using a closed-end survey format. This study utilized a 1-5 Likert scale as the measurement tool.

Data processing was conducted using SPSS (Statistical Product and Service Solutions) software, including validity tests, reliability tests, classical assumption tests, multiple linear regression tests, hypothesis testing, and analysis of the coefficient of determination.

RESULTS AND DISCUSSION

In this study, data was analyzed using descriptive analysis to provide an overview of the data distribution. Data collection was conducted using a questionnaire via Google Forms, which was distributed to 106 students as respondents.

The measurement of critical thinking skills in this study used five indicators Mincemoyer (2001), namely analysis/information processing, inquiry, reasoning, flexibility, and evaluation from. The indicator with the highest average score was reasoning. Meanwhile, the lowest average score was found in the inquiry indicator, which refers to information requests or questions. This indicates that most students can solve problems by engaging their thinking, although only a few students can articulate their thoughts. The measurement of artificial intelligence usage in this study used three indicators Kautsar et al (2024): knowledge of generative AI, willingness to use generative AI, and concern about generative AI . The indicator with the highest average was willingness to use generative AI. Meanwhile, the indicator with the lowest average was concern about generative AI. The measurement of digital literacy in this study used six indicators Rodríguez-de-Dios et al (2016), namely using technology effectively, communicating using digital technology, finding, obtaining, and evaluating information from digital sources, critically analyzing the information obtained, using interactive communication without taking risks and dangers that could affect the personal safety of adolescents, and taking preventive measures to maintain the security of digital devices and avoid potential threats such as viruses and spyware. The indicator with the highest average score was the effective use of technology. The indicator with the lowest average score was communication using digital technology.

Table 1. Descriptive Analysis Result

	N	Minimum	Maximum	Mean	Std. Devition
Use of AI	106	22	22	66.77	9.529
Digital Literacy	106	58	100	73.06	8.756
Critical Thinking Skills	106	39	95	79.47	9.470
Valid N (listwise)	106				

Source: Data Processed by Researchers (2025)

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Table 1 shows that each variable consists of 106 students. The AI Usage variable has a minimum value of 22, a maximum value of 90, with a mean of 66.77 and a standard deviation of 9.529. Meanwhile, the Digital Literacy variable has a minimum value of 58 and a maximum value of 100, with a mean of 73.06 and a standard deviation of 8.756. The Critical Thinking Ability (Y) variable has a minimum value of 39 and a maximum value of 95, with a mean of 79.47 and a standard deviation of 9.470.

Table 2. Validity Test Results

Indikator	Item	R hitung	R tabel	Kesimpulan
Critical Thinking Skills				
Kemampuan memecah ide-ide dan masalah menjadi bagian kecil dan menganalisisnya	Y.1	0,693	0,190	Valid
	Y.2	0,721	0,190	Valid
	Y.3	0,621	0,190	Valid
	Y.4	0,665	0,190	Valid
Menemukan, mengumpulkan, mengingat informasi relevan	Y.5	0,598	0,190	Valid
	Y.6	0,659	0,190	Valid
	Y.7	0,702	0,190	Valid
	Y.8	0,675	0,190	Valid
	Y.9	0,692	0,190	Valid
Mengeksplorasi implikasi dan konsekuensi	Y.10	0,567	0,190	Valid
	Y.11	0,746	0,190	Valid
	Y.12	0,782	0,190	Valid
	Y.13	0,629	0,190	Valid
Berpikiran terbuka terhadap ide-ide baru	Y.14	0,719	0,190	Valid
	Y.15	0,720	0,190	Valid
	Y.16	0,673	0,190	Valid
	Y.17	0,504	0,190	Valid
Mengevaluasi kemungkinan dan probilitas	Y.18	0,646	0,190	Valid
	Y.19	0,678	0,190	Valid
Use of Artificial Intelligence (AI)				
Knowledge of AI	X1.1	0,639	0,190	Valid
	X1.2	0,693	0,190	Valid
	X1.3	0,680	0,190	Valid
	X1.4	0,588	0,190	Valid
	X1.5	0,704	0,190	Valid
	X1.6	0,573	0,190	Valid
Wllingness to use generative AI	X1.7	0,684	0,190	Valid
	X1.8	0,677	0,190	Valid
	X1.9	0,669	0,190	Valid
	X1.10	0,631	0,190	Valid
	X1.11	0,692	0,190	Valid
	X1.12	0,742	0,190	Valid
	X1.13	0,602	0,190	Valid
	X1.14	0,609	0,190	Valid
Concerns about generative AI	X1.15	0,423	0,190	Valid
	X1.16	0,457	0,190	Valid
	X1.17	0,348	0,190	Valid
	X1.18	0,345	0,190	Valid
Digital Literacy				
Menggunakan teknologi digital secara efektif	X2.1	0,336	0,190	Valid
	X2.2	0,500	0,190	Valid
	X2.3	0,520	0,190	Valid
	X2.4	0,537	0,190	Valid
Berkomunikasi menggunakan teknologi digital	X2.5	0,408	0,190	Valid
	X2.6	0,383	0,190	Valid
Menemukan, memperoleh dan	X2.7	0,465	0,190	Valid

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mengevaluasi informasi dari digital	X2.8	0,363	0,190	Valid
	X2.9	0,412	0,190	Valid
	X2.10	0,586	0,190	Valid
	X2.11	0,576	0,190	Valid
Menganalisis secara kritis informasi yang telah didapat	X2.12	0,838	0,190	Valid
	X2.13	0,622	0,190	Valid
Menggunakan komunikasi interaktif tanpa mengambil risiko dan bahaya yang dapat memengaruhi keamanan pribadi remaja	X2.14	0,225	0,190	Valid
	X2.15	0,363	0,190	Valid
	X2.16	0,338	0,190	Valid
	X2.17	0,318	0,190	Valid
Melakukan tindakan pencegahan untuk menjaga keamanan perangkat digital dan menghindari potensi ancaman seperti virus dan *spyware*	X2.18	0,423	0,190	Valid
	X2.19	0,638	0,190	Valid
	X2.20	0,543	0,190	Valid

Source: Data Processed by Researchers (2025)

Table 2 shows that each question item has a calculated r value > table r 0.190. In conclusion, it can be said that each statement item from the indicators on the variables of critical thinking skills, use of artificial intelligence (AI), and digital literacy is valid and can be used in research.

Tabel 1. Reliability Test Results

Variabel	Cronbach's Alpha	N of Item	Keterangan
Use of *Artificial Intelligence* (AI) (X1)	0,875	18	Reliabel
Digital Literacy (X2)	0,792	20	Reliabel
Critical Thinking Skills (Y)	0,929	19	Reliabel

Source: Data Processed by Researchers (2025)

Table 3 shows that the variables in this study have a Cronbach's Alpha value greater than 0.60, which means that all variables are reliable and suitable for use.

Normality testing is conducted to determine whether the collected data has a normal distribution. This test aims to find out whether the distribution of the analyzed data has a pattern that resembles a normal distribution. In this study, the Kolmogorov-Smirnov test was used to test the normality of the data.

Tabel 2. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		Unstandariz ed Residual
N		106
Normal Parameters[a.b]	Mean	.0000000
	Std. Deviation	7.51578780
Most Extreme Differences	Absolute	.077
	Positive	.054
	Negative	-.077
Test Statistic		.077
Asymp. Sig. (2-tailed)		.135[c]

Source: Data Processed by Researchers (2025)

Table 4 shows that a significance value of 0.135 was obtained, which is greater than 0.05. Therefore, it can be concluded that the tested data meets the requirements of normal distribution.

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This study applied multiple regression analysis. SPSS version 22 software was used to process the research data. The following results were obtained:

Tabel 3. Multiple Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinarity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	26.764	6.820		3.925	.000		
	Penggunaan AI	.253	.086	.354	2.932	.004	.813	1.230
	Literasi Digital	.490	.094	.453	5.228	.000	.813	1.230

Source: Data Processed by Researchers (2025)

Based on Table 5, the regression equation Y=26.764 + 0.253 X1 + 0.490 X2 is obtained. This means that the constant value of 26.764 indicates that if the use of AI and digital literacy is 1, then critical thinking ability will be at 26.764. The coefficient for AI usage is 0.253, which is positive, meaning that for every 1 increase in AI usage, critical thinking ability will increase by 0.253. The coefficient for digital literacy is 0.490, which is positive, meaning that for every 1 increase in digital literacy, critical thinking ability will increase by 0.490.

A partial test (t-test) was used to analyze the significant influence of the dependent variable on the independent variable. Hypothesis testing in this study used SPSS, with a significance level of 0.05 (a=5%). Based on Table 5, the significance of the AI usage variable is 0.004, which is less than 0.05, meaning that the use of artificial intelligence has a significant influence on critical thinking ability. The digital literacy variable shows a significance value of 0.000, which is less than 0.05, meaning that digital literacy has a significant influence on critical thinking ability.

The F test or simultaneous test was used to determine whether all independent variables together had a significant effect on the dependent variable in the regression model.

Tabel 4. F-test Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3485.273	2	1742.637	30.263	.000[b]
	Residual	5931.142	103	57.584		
	Total	9416.415	105			

Source: Data Processed by Researchers (2025)

Table 6 shows that the significance value is 0.000, which means < 0.05, from which it can be concluded that the simultaneous use of Artificial Intelligence (AI) and Digital Literacy has a significant impact on Critical Thinking Skills.

Based on the research findings, it was found that the use of AI involves the utilization of intelligent systems capable of personalizing learning, providing quick and relevant feedback, assisting in real-time information analysis, and supporting interactive, adaptive, and efficient learning processes. This study emphasizes that if used appropriately and wisely, AI has great potential in enhancing students' critical thinking skills. Therefore, if students use artificial intelligence effectively, their critical thinking skills will improve. This is evidenced by the statement that the better students use artificial intelligence, the better their critical thinking skills become. Therefore, it is important to maximize the benefits of AI use and minimize its negative impacts by considering strategic steps from various parties, starting from oneself, schools, to educational institutions.

Furthermore, digital literacy is not just about finding, evaluating, understanding, creating, and sharing information, but also about understanding how technology can influence daily life and utilizing it effectively. Good digital literacy in this generation will help individuals be responsible and skilled in both the digital world and daily life. Therefore, individuals with strong digital literacy skills tend to have good critical thinking abilities, and the freedom to access knowledge fosters diverse patterns of thought. The higher a student's digital literacy, the higher

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their critical thinking ability. Therefore, in classroom learning, the use of digital learning media should be optimized to facilitate students' thinking skills.

Research Zaini et al (2025) states that artificial intelligence is not only a technical tool, but has evolved into a cognitive partner that helps hone digital literacy skills, validate information sources, and stimulate the development of argumentative logic in the context of Solutions. The use of AI in learning has proven to expand students' thinking by combining new knowledge with prior knowledge, as well as fostering learning autonomy in the complex global information flow. However, the successful integration of AI in fostering digital literacy and critical thinking is contingent upon the teacher's role as a facilitator, guide, and supervisor of the learning process. Therefore, it can be concluded that the use of artificial intelligence (AI) and mastery of digital literacy are strategic factors in fostering students' critical thinking skills. Thus, the integration of AI and digital literacy in enhancing students' critical thinking skills needs to be optimized in the learning process.

CONCLUSION

Based on the results of the research analysis and discussion, it can be concluded that the use of artificial intelligence affects students' critical thinking skills. This means that the better students are at using artificial intelligence, the better their critical thinking skills will be. Digital literacy also affects students' critical thinking skills. This means that as digital literacy increases, so too will students' critical thinking skills. Simultaneously, the use of artificial intelligence and digital literacy influence the critical thinking skills of MPLB students at SMK Negeri 42 Jakarta. This means that the effective use of artificial intelligence and digital literacy will enhance students' critical thinking skills. Therefore, in this context, learning with the use of artificial intelligence becomes more optimal when supported by good digital literacy, thereby fostering students who possess the ability to think critically.

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