

Correlation Between AI Usage, Digital Literacy, and Students' Self-Efficacy in Paragraph Writing

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Abstract: This investigation examines the correlation between AI usage, digital literacy, and students' self-efficacy in the Paragraph Writing course. In this study, digital literacy is conceptualized as students' capacity to locate, critically assess, and responsibly utilize digital information. Meanwhile, AI usage focuses on AI usage to assist students in the writing process. This study employed a correlational design. The sample consisted of 109 students from the English Language Education Program at Muhammadiyah University of Surakarta, selected using random sampling. Data were collected through a Likert-scale questionnaire and analyzed using multiple and Spearman's rank correlation analyses. The results indicated a significant correlation between AI usage and self-efficacy, with a correlation coefficient of 0.343, classified as low. Additionally, there is a significant correlation between digital literacy and self-efficacy, with a correlation coefficient of 0.630, classified as strong. The multiple correlation analysis showed that students' self-efficacy and AI usage with digital literacy together are significantly correlated, with a correlation coefficient of 0.662. Digital literacy has a stronger correlation with self-efficacy than AI usage. Therefore, the use of AI needs to be balanced with digital literacy so that students are more confident in writing English paragraphs.

Keywords: AI usage, digital literacy, self-efficacy, paragraph writing

INTRODUCTION

The use of Artificial Intelligence (AI) in student learning environments has become a pressing issue in contemporary education. Artificial Intelligence can contribute to the development of educational technology, which is an effective and personalized learning facility (Putri et al., 2023). In English language acquisition, AI tools help learners expand their ideas and receive constructive feedback. In addition, the Global Student Survey (2025) indicates that Indonesia ranks highest globally in student AI adoption, with approximately 95% of learners engaging these tools and only 5% opting out of AI-assisted learning.

Writing a paragraph is a complex skill (Amnuai & Suwannabubpha, 2025). A paragraph should be written according to the main idea and coherent arguments, as well as

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with correct punctuation to support clarity. Moreover, Errors in grammar can lead to misunderstandings (Sa'adah, 2020). Many students still find writing difficult, particularly when it comes to generating ideas; around 80% of students struggle to come up with ideas because they lack confidence in their writing (Aprilia et al., 2020). In addition to generating ideas, students also struggle with choosing vocabulary, paraphrasing, and applying grammar rules. Self-efficacy has a significant impact on students' writing skills, depending on their level of self-confidence, which leads to better writing performance (Putri & Falasifah, 2025).

According to Bandura (2006), self-efficacy is a person's belief in their own ability to act. Self-efficacy is related to a person's confidence in their ability to achieve their desired result. In English language learning, self-efficacy plays a role in enhancing students' motivation for academic achievement. As a result, students with high self-efficacy find it easier to understand the materials, whereas those with low self-efficacy perceive the material as extremely difficult. Therefore, writing self-efficacy plays a crucial role in their academic performance and in students' writing skills.

According to Oshima & Hogue (2017), A paragraph is a group of related sentences that form a specific concept or topic. A recent study conducted by Wau (2022) defines a paragraph as a cohesive group of sentences organized around a central idea and supported by relevant details. Thus, paragraph writing is the skill of composing well-organized paragraphs. At the university level, paragraph writing focuses on developing paragraphs such as narrative, descriptive, cause and effect, argumentative, and others. Therefore, in the course, students must improve their ability to organize and develop ideas so that their paragraph writing becomes more well-structured.

The use of AI in the writing process has the potential to improve writing quality and develop a more ethical perspective. AI technologies such as ChatGPT, Grammarly, and Google Translate help increase efficiency in writing, composing, and revising (Assidiq, 2024). Artificial Intelligence (AI) helps students develop creative ideas. Furthermore, when used wisely, it can assist students in the writing process, thereby supporting their motivation and self-efficacy in completing assignments. Thus, AI has the potential to enhance students' self-efficacy (Huang & Mizumoto, 2024).

Technology tools such as AI are considered to help students in the writing process, particularly in providing instant feedback, thereby helping students improve their writing skills (Lubis & Sya, 2025). In the Paragraph Writing course, the use of AI is seen as a tool to help students brainstorm, create paragraph outlines, and correct grammar. Additionally, AI is utilized in the revision and editing processes. For example, tools such as ChatGPT, Grammarly, and QuillBot developing ideas, drafting, and proofreading, people often use writing (Putera et al., 2026). Thus, the use of AI is seen as a way to improve vocabulary and structure paragraphs effectively.

Digital literacy is a mandatory skill that students must have in the rapidly developing modern era (Maknuni, 2024). Students with high digital literacy are typically more productive. In addition, students with good digital literacy will find it easier to access and use artificial Intelligence (AI). Therefore, digital literacy is a major factor influencing the use of AI by students (Joseph et al., 2022).

Digital literacy is a crucial skill for supporting students' learning in this digital era. Students with strong digital literacy will be able to effectively utilize AI technology in the context of the paragraph writing process, such as searching for information, identifying keywords, and developing paragraphs (Tinnmaz et al., 2022). Consequently, digital literacy correlates with students' ability to use AI tools and also self-efficacy in paragraph writing.

Previous studies have shown that the use of AI can help students improve their writing skills and provide rapid feedback (Syahira et al., 2023). Additionally, the use of AI has a positive impact on students' motivation to learn, their understanding of the material, and their improvement in their writing skills (Hidayatullah, 2024). Students believe that AI technologies, such as QuillBot, Grammarly, and ChatGPT, help them generate ideas (Anggraeni, 2025). AI also influences students' critical thinking skills and digital literacy (Ernalina et al., 2025). Digital literacy skills are considered important because high literacy skills influence students' ability to use AI tools (Anhar & Artiningsih, 2026). The previous studies have discussed the correlation between AI and self-efficacy in Morocco (Huang & Mizumoto, 2024).

Most previous studies have examined students' English writing skills in general terms, but there is no research that focuses on paragraph writing. Furthermore, while previous studies have largely relied on perceptions, none have employed a quantitative correlation approach to data. Additionally, no research has yet examined the correlation of AI usage, digital literacy, and self-efficacy, particularly within the local context of University Muhammadiyah Surakarta. Therefore, this study aims to fill the gap "Correlation of AI Usage, Digital Literacy, and Students' Self-efficacy in Paragraph Writing".

Based on the introduction, the research question is:

1. Is there a significant correlation between AI usage and students' self-efficacy in paragraph writing?
2. Is there a significant correlation between students' digital literacy and students' self-efficacy in paragraph writing?
3. Is there a significant correlation between AI usage, digital literacy, and students' self-efficacy in paragraph writing?

METHOD

A. Research design

This study employs a quantitative method with a correlational design to examine the correlation of AI usage, digital literacy, and self-efficacy in paragraph writing. This quantitative study is used to analyze numerical data with the aim of determining whether there is a correlation between the variables. Thus, this study is intended to identify correlation rather than establish cause-and-effect correlation. It is hoped that this study will provide an overview of whether or not a correlation exists between the variables.

B. Sample and participants

This study was conducted at Muhammadiyah University of Surakarta from February 2026 to July 2026. The target population comprised all students enrolled in the Paragraph Writing course at the English Language Education program, Muhammadiyah University of

Surakarta, a total of 149 students. The sample was selected using random sampling. To calculate the sample size, the following formula from Slovin (Sugiyono, 2020). With error 5% sample size required for this study is 109 students.

C. Research instrument

The instrument contained several questions designed to measure three variables. Each variable dimension consisted of 6 positive and negative questions, as follows.

1. AI Usage Scale

The AI usage measurement instrument was constructed by the researcher drawing upon the Technology Acceptance Model (TAM) dimensions proposed by Davis (1989), encompassing Perceived Usefulness and Perceived Ease of Use. The scale comprised 12 items arranged on a Likert format.

Table 1. AI usage scale questionnaire

Variable	Indicator	Favourable Questions	Unfavourable Questions	Items
AI Usage	Perceived usefulness	PU1, PU3, PU5	PU2, PU4, PU6	6
	Perceived Ease of Use	PEOU1, PEOU3, PEOU5	PEOU2, PEOU4, PEOU6	6
Total				12

2. Digital Literacy Scale

This research instrument was developed by the researcher based on Gilster's (1997) digital literacy theory dimensions. These dimensions include information literacy, critical thinking, technical skills, and digital ethics. The questionnaire uses a Likert scale consisting of 24 items.

Table 2. Digital literacy scale questionnaire

Variable	Indicator	Favourable Questions	Unfavourable Questions	Items
Digital Literacy	Information literacy	IL1, IL3, IL5	IL2, IL4, IL6	6
	Critical thinking	CT1, CT3, CT5	CT2, CT4, CT6	6
	Technical skills	TS1, TS3, TS5	TS2, TS4, TS6	6
	Digital ethics	DE1, DE3, DE5	DE2, DE4, DE6	6
Total				24

3. Self-efficacy Scale

The self-efficacy instrument was constructed with reference to Bandura's (1997) self-efficacy theory, encompassing the dimensions of level, strength, and generality. The scale consisted of 18 items formatted on a Likert scale.

Table 3. Self-efficacy scale questionnaire

Variable	Indicator	Favourable Questions	Unfavourable Questions	Items
Self-efficacy	Level	LV1, LV3, LV5	LV2, LV4, LV6	6
	Strength	ST1, ST3, ST5	ST2, ST4, ST6	6
	Generality	GL1, GL3, GL5	GL2, GL4, GL6	6
Total				18

Based on the description of the research instruments above, it can be concluded that this study uses a questionnaire as a tool to measure three variables. All instruments were developed based on relevant theories into indicators corresponding to each variable. Overall, this research instrument consists of 54 questions; each indicator contains both favorable and unfavorable questions, which are randomly distributed to obtain more objective data and reduce the possibility of respondent bias. Items were presented as closed-ended statements scored on a four-point Likert scale with anchors ranging from strongly disagree (1), disagree (2), agree (3), to strongly agree (4).

D. Technique of data collection

The data for this study were collected using a questionnaire distributed to respondents online via Google Forms through the use of the class project leader or class president to facilitate the data collection process. This study used a questionnaire to collect data. The questionnaire was developed by the researcher and included questions related to each dependent and independent variable. During the data analysis process, unfavorable questions underwent reverse scoring. For favorable items, scores range from 1 for "strongly disagree" to 4 for "strongly agree." Meanwhile, for unfavorable items, the scoring is reversed, ranging from 4 for "strongly disagree" to 1 for "strongly agree." This technique is used to ensure that the direction of the research remains consistent across all items, so that higher scores indicate a higher level of the variable.

E. Technique of data analysis

The analytical framework employed in this study is quantitative in nature, designed to elucidate the relationships among AI adoption, digital literacy, and writing self-efficacy in the Paragraph Writing course. Survey data were processed through SPSS statistical software, encompassing validity testing, reliability assessment, normality testing, linearity testing, bivariate correlation analysis, and multiple correlation analysis.

RESULTS

A. Results of the statements/questionnaire and responses

Table 4. Results of the statements/questionnaire and responses

Variables	Questions	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
AI Usage	When brainstorming ideas for a paragraph, AI helps me expand on my ideas and make them clearer	1.8%	2.8%	52.3%	43.1%
	When brainstorming ideas for a paragraph, AI does not help me expand on my ideas and make them clearer	19.3%	51.4%	21.1%	8.3%
	When structuring a paragraph, AI can help me create a topic sentence, supporting sentences, and a concluding sentence	1.8%	3.7%	65.1%	29.4%
	When structuring a paragraph, AI cannot help me create a topic sentence, supporting sentences, and a concluding sentence	15.6%	55%	21.1%	8.3%
	When revising my writing, AI can help me	1.8%	2.8%	62.4%	33%
	When revising my writing, AI cannot help me	25.7	52.3	17.4	4.6
	When using AI to write paragraphs, I don't find it difficult	2.8%	16.5%	61.5%	19.3%
	When using AI to write, I find it difficult	24.8	54.1	17.4	3.7
	To help with the paragraph writing assignment, I find that AI is easily accessible at any time	1.8%	7.3%	61.5%	29.4%
	When it comes to paragraph writing assignments, AI isn't always readily available	17.4%	48.6%	22%	11.9%

Variables	Questions	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
	When learning paragraph writing, I feel comfortable using AI	1.8%	11%	69.7%	17.4%
	When learning paragraph writing, I don't feel comfortable using AI	21.1%	62.4%	12.8%	3.7%
Digital Literacy	When writing paragraphs, I am able to find relevant information	0%	5.5%	73.4%	21.1%
	When writing paragraphs, I am not able to find relevant information	14.7%	56%	19.3%	10.1%
	When writing paragraphs, I can select valid sources of information	0.9%	5.5%	65.1%	28.4%
	When writing paragraphs, I cannot select valid sources of information	15.6%	64.2%	15.6%	4.6%
	To develop the content of my paragraphs, I use various digital sources such as e-books, journals, websites, etc.	0%	6.4%	67.9%	25.7%
	To develop the content of my paragraphs, I do not use various digital sources such as e-books, journals, websites, etc.	27.5%	54.1%	11%	7.3%
	When writing paragraphs, I analyze the accuracy of information from digital sources before using it	0.9%	4.6%	72.5%	22%
	Before utilizing digital sources (such as e-books, journals, or websites), I tend to use the information without analyzing it first	17.9%	44%	33.9%	4.6%

Variables	Questions	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
	When writing paragraphs, I am able to develop ideas logically	0%	9.2%	70.6%	20.2%
	When writing paragraphs, I am unable to develop ideas logically	15.6%	55%	24.8%	4.6%
	Before including information in my paragraphs, I evaluate its accuracy	0%	2.8%	73.4%	23.9%
	Before including information in my paragraphs, I do not evaluate its accuracy	27.5%	58.7%	8.3%	5.5%
	When writing paragraphs, I am able to use AI	0.9%	11%	66.1%	22%
	When writing paragraphs, I do not use AI	13.8%	62.4%	20.2%	3.7%
	For drafting and revising paragraphs, I use technology such as AI	1.8%	9.2%	71.6%	17.4%
	For drafting and revising paragraphs, I am unable to use technologies such as AI	12.8%	61.5%	18.3%	7.3%
	In my Paragraph Writing course, I am accustomed to using digital tools such as AI	2.8%	18.3%	64.2%	14.7%
	In my Paragraph Writing course, I am not accustomed to using digital tools such as AI	14.7%	62.4%	16.5%	6.4%
	Without relying on it entirely, I am able to use AI wisely	0.9%	3.7%	69.7%	25.7%
	When using AI, I tend to rely on it entirely	14.7%	47.7%	25.7%	11.9%
	When writing paragraphs, I avoid plagiarism	0%	6.4%	54.1%	39.4%

Variables	Questions	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
	When writing paragraphs, I do not avoid plagiarism	31.2%	52.3%	11.9%	4.6%
	Even though I'm assisted by AI, I still use my own ideas	0%	5.5%	56.9%	37.6%
	When writing paragraphs, everything is done with the help of AI, so I don't use my own ideas	33.9%	49.5%	11.9%	4.6%
Self-efficacy	By using AI and my digital literacy skills, I'm confident I can write complete paragraphs	0.9%	4.6%	62.4%	32.1%
	By using AI and my digital literacy skills, I'm not confident I can write complete paragraphs	15.6%	51.4%	25.7%	7.3%
	When writing paragraphs, I'm confident I can create coherent and interconnected paragraphs, even when the topic is difficult	1.8%	34.9%	48.6%	14.7%
	When composing paragraphs, I am not confident in creating coherent and well-connected paragraphs, especially when the topic is difficult	8.3%	23.9%	54.1%	13.8%
	When writing paragraphs, I am able to develop ideas into structured paragraphs	0%	15.6%	72.5%	11.9%
	To create well-structured paragraphs, I am unable to develop ideas	21.1%	56%	19.3%	3.7%
	Despite difficulties in composing paragraphs, I remain confident	2.8%	18.3%	55%	23.9%

Variables	Questions	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
	Despite difficulties in composing paragraphs, I feel unconfident	12.8%	45.9%	32.1%	9.2%
	When writing paragraphs, I don't give up easily	0%	11.9%	54.1%	33.9%
	When writing paragraphs, I feel like giving up easily	10.1%	47.7%	34.9%	7.3%
	I keep trying to improve the quality of my writing	0%	1.8%	47.7%	50.5%
	After writing a paragraph, I don't try to improve the quality of my writing	33.9%	51.4%	11%	3.7%
	In various situations, I feel confident writing paragraphs	1.8%	20.2%	58.7%	19.3%
	In various situations, I do not feel confident writing paragraphs	13.8%	25.7%	47.7%	12.8%
	In general, I am confident in my ability to write paragraphs	1.8%	17.4%	66.1%	14.7%
	In general, I am not confident in my ability to write paragraphs	13.8%	49.5%	27.5%	9.2%
	In various academic and non-academic contexts, I am able to apply my paragraph-writing skills	1.8%	13.8%	68.8%	15.6%
	In various academic and non-academic contexts, I am unable to apply my paragraph-writing skills	12.8%	63.3%	17.4%	6.4%

B. Data descriptive

Table 5. Descriptive Statistics Table

Variable	Mean	Std. Deviation	Minimum	Maximum
AI usage	23.86	3.668	15	32

Digital Literacy	57.71	6.008	44	74
Self-efficacy	51.82	6.661	36	72

Descriptive statistical analysis was conducted on the data obtained; the data were obtained from a sample of 109 respondents (n). Variable AI usage (X1) has a range value of 15 to 32, a mean of 23.86 with a standard deviation of 3.668. This indicates that respondents' AI usage falls into the moderate to high category. Variable Digital literacy (X2) has a mean of 57, a standard deviation of 6.008, and a range of 44 to 74. Variable Self-efficacy (Y) has a range of 36 to 72, with a mean of 51.82 and a standard deviation of 6.661.

The mean value, which falls between the maximum and minimum values, shows the general degree of AI usage among respondents. Variable AI usage (X1) has a minimum value of 15 and a maximum value of 32, with a mean of 23.86 and a standard deviation of 3.668, indicating it is classified as moderate or at a medium level. Variable Digital literacy (X2) has a minimum value of 44 and a maximum value of 74, with a mean of 57 and a standard deviation of 6.008, and is therefore classified as moderate or at an intermediate level. Meanwhile, variable Self-efficacy (Y) has a minimum value of 36 and a maximum value of 72, with a mean of 51.82 and a standard deviation of 6.661, indicating it is therefore classified as moderate or at a medium level.

C. Data analysis

1. Validity test

Table 6. Validity test table

Variable	Code	Calculated-R	Sig	Notes
AI usage (X1)	PU1	0.291	0.002	Valid
	PU2	0.314	0.001	Valid
	PU4	0.533	0.000	Valid
	PU6	0.525	0.000	Valid
	PEOU2	0.579	0.000	Valid
	PEOU3	0.225	0.019	Valid
	PEOU4	0.501	0.000	Valid
	PEOU6	0.388	0.000	Valid
Digital literacy (X2)	IL1	0.225	0.019	Valid
	IL2	0.591	0.000	Valid
	IL3	0.267	0.005	Valid
	IL4	0.555	0.000	Valid
	IL5	0.203	0.034	Valid
	IL6	0.487	0.000	Valid
	CT3	0.288	0.002	Valid
	CT4	0.606	0.000	Valid
	CT5	0.412	0.000	Valid
	CT6	0.678	0.000	Valid

Variable	Code	Calculated-R	Sig	Notes
Self-efficacy (Y)	TS2	0.318	0.001	Valid
	TS4	0.377	0.000	Valid
	TS6	0.440	0.000	Valid
	DE1	0.315	0.001	Valid
	DE2	0.372	0.000	Valid
	DE3	0.292	0.002	Valid
	DE4	0.477	0.000	Valid
	DE5	0.303	0.001	Valid
	DE6	0.505	0.000	Valid
	LV1	0.320	0.001	Valid
	LV2	0.536	0.000	Valid
	LV3	0.321	0.001	Valid
	LV4	0.541	0.000	Valid
	LV5	0.434	0.000	Valid
	LV6	0.565	0.000	Valid
	ST1	0.299	0.002	Valid
	ST2	0.633	0.000	Valid
	ST3	0.504	0.000	Valid
	ST4	0.454	0.000	Valid
	ST5	0.372	0.000	Valid
	ST6	0.568	0.000	Valid
	GL1	0.347	0.000	Valid
	GL2	0.312	0.001	Valid
	GL3	0.456	0.000	Valid
	GL4	0.608	0.000	Valid
	GL5	0.214	0.025	Valid
	GL6	0.579	0.000	Valid

PU: Perceived Usefulness; PEOU: Perceived Ease of Use; IL: Information Literacy; CT: Critical Thinking; TS: Technical Skills; DE: Digital Ethics; LV: Level; ST: Strength; GL: Generality

Not all questionnaire items met the validity criteria, as indicated by the results of the validity test shown in the table. Of the 54 items developed, 45 were deemed valid because they had a correlation coefficient greater than 0.88 and a significance level below 0.05. The remaining nine items were deemed invalid and were therefore not used in further analysis. Consequently, only the 45 items that met the validity criteria were used to analyze the research data.

2. Reliability test

Table 7. Reliability table

Cronbach's Alpha	N of Items	Notes
0.901	45	Reliable

Based on the reliability test using Cronbach's Alpha with 45 items, the scale was found to be reliable and suitable for use as a research data collection tool. Furthermore, a Cronbach's Alpha of 0.901 indicates a very high level of reliability, suggesting that the data is consistent and stable.

3. Normality test

Table 8. Normality Test Table

Variable	Kolmogorov-Smirnov Sig.	Notes
X1	0.002	Not Normal
X2	0.001	Not Normal
Y	0.200	Normal

Based on the results of the normality test in the table above, variable X1 obtained a significance value of 0.002. Since this value is less than 0.005, variable X1 is deemed non-normal. Furthermore, variable X2 obtained a significance value of 0.001; since this value is also less than 0.05, variable X2 is deemed non-normal. Meanwhile, variable Y obtained a significance value of 0.200. Since this value is greater than 0.05, variable Y is deemed to be normally distributed.

Based on the results of the normality tests, it is concluded that the research data are not fully normally distributed because there are still variables with significance values (sig.) below 0.05. Therefore, the correlation analysis in this study uses the Spearman rank test because it is more appropriate for data that is not normally distributed.

4. Linearity Test

Table 9. Linearity test table

Variable	Sig. Deviation from Linearity	Notes
X1 relative to Y	0.419	Linear
X2 relative to Y	0.776	Linear

Based on the results of the linearity test, a significant value of 0.419 and 0.776 was found for the Deviation from Linearity test findings. Variables X1, X2, and Y are linear. This value is greater than 0.05, so it can be concluded that variables X1, X2, and Y are linear.

These results indicate that changes in one variable are consistently followed by changes in variable Y, so the correlation between the two variables satisfies the assumption of linearity and can be used for further analysis.

5. Hypothesis test

5.1. There is a significant correlation between variable AI usage (X1) and self-efficacy (Y)

Table 10. Hypothesis test X1 and Y

Variable	Correlation Coefficient	Sig. (2-tailed)	Notes
X1 between Y	0.343	0.000	Correlation

Based on the results of the correlation analysis using Spearman's rho, a correlation value of 0.343 was obtained using a p-value of 0.000. Since the p-value is less than 0.05, it can be inferred that there is a correlation between variable AI usage (X1) and variable self-efficacy (Y)

A correlation value of 0.343 indicates that the correlation between variable AI usage (X1) and variable self-efficacy (Y) falls into the low category. According to Sugiyono (2020), correlation coefficients in the range of 0.20–0.399 fall into the low correlation category. Furthermore, a positive correlation indicates that the correlation between the two variables is positive, meaning that as variable AI usage (X1) increases, variable self-efficacy (Y) also tends to increase.

5.2. There is a significant correlation between variable digital literacy (X2) and self-efficacy (Y)

Table 11. Hypothesis test X2 and Y

Variable	Correlation Coefficient	Sig. (2-tailed)	Notes
X2 between Y	0.630	0.000	Correlation

Based on the results of the correlation analysis using Spearman's rho, a correlation value of 0.630 was obtained with a p-value of 0.000. Since the p-value is lower than 0.05, it can be concluded that there is a correlation between variable digital literacy (X2) and variable self-efficacy (Y)

A correlation value of 0.630 indicates that the correlation between variable digital literacy (X2) and variable self-efficacy (Y) falls into the strong category. According to Sugiyono (2020), a correlation coefficient in the range of 0.60–0.799 is classified as a strong correlation. Furthermore, a positive correlation value indicates that the correlation between the two variables is direct, meaning that as variable digital literacy (X2) increases, variable self-efficacy (Y) also tends to increase.

5.3. There is a significant correlation between variable AI usage (X1), digital literacy (X2), and self-efficacy (Y)

Table 12. Hypotesis test X1,X2, and Y

Variable	Correlation Coefficient	Sig. (2-tailed)	Notes
X1 and X2 between Y	0.662	0.000	Correlation

Based on the results of the analysis using multiple correlations, a correlation value of 0.662 was obtained with a significance level of 0.000. Since the significance level is less than 0.05, it can be concluded that there is a correlation between variables AI usage (X1) and digital literacy (X2), and variable self-efficacy (Y)

A correlation coefficient of 0.662 indicates that the correlation between variable AI usage (X1), digital literacy (X2), and variable self-efficacy (Y) falls into the strong category. According to Sugiyono (2020), a correlation coefficient in the range of 0.60–0.799 is

classified as a strong correlation. Furthermore, a positive correlation value indicates that the correlation between the two variables is positive, meaning that as the values of variables AI usage (X1) and digital literacy (X2) increase, the value of variable self-efficacy (Y) also tends to increase.

DISCUSSION

A. Correlation between AI usage (X1) and self-efficacy (Y)

The results of the correlation test using Spearman's rank between variables X1 and Y show a correlation value of 0.343 with a p-value of 0.000, indicating that variables X1 and Y are correlated, though the correlation is weak. This is consistent with studies carried out by Bouzar et al. (2024), which explain that the use of AI, such as ChatGPT, can enhance students' academic writing self-efficacy. However, the correlation level in this study is still relatively low because students do not rely solely on AI to build their self-efficacy. This is supported by research by Zhang et al. (2024), which explains that students' writing ability does not have a strong direct correlation with AI usage but is impacted by additional factors such as academic stress and performance expectations. These findings indicate that AI assists students in the writing process, such as brainstorming, revising, and refining their work. The questionnaire results also support these findings. Most students agreed that AI helps them clarify their ideas and structure their paragraphs with topic sentences, supporting sentences, and concluding sentences. In addition, most respondents said that AI is easy to use and helpful during Paragraph Writing activities. According to these responses, students view AI as a useful tool to support the writing process. However, excessive reliance on AI does not necessarily boost students' self-efficacy regarding their own writing abilities. Students' writing skills are influenced not only by the use of technology but also by their own abilities, such as critical thinking and the ability to comprehend digital information (Haliq & Mahande, 2025). Excessive use of technology can lead students to become dependent on technology and lose their critical thinking skills, which can result in underdeveloped writing skills and low self-efficacy.

Aljuaid's (2024) research also explains that AI helps students with grammar checking, paraphrasing, and academic writing, but AI cannot fully replace students' critical thinking, creativity, argumentation, and analytical skills in writing. Additionally, Yu (2024) explains that excessive use of AI-assisted writing can increase students' dependence on technology during the writing process. This situation causes students to struggle when writing without AI assistance, thereby hindering the development of their own writing skills. Therefore, the use of AI in paragraph writing instruction must be balanced with students' critical thinking skills.

This aligns with Bandura's (1997) self-efficacy theory, which explains that self-efficacy is influenced by an individual's belief in their own abilities through mastery experiences. In this study, students may feel that AI is easy to use in assisting with writing, but their confidence in their writing abilities has not increased significantly because the writing process is aided by AI. Therefore, the correlation between AI usage and self-efficacy in this study is classified as low, even though it is statistically significant.

B. Correlation between digital literacy (X2) and self-efficacy (Y)

The results of the Spearman's rank correlation test between variables X2 and Y yielded a correlation coefficient of 0.630 with a p-value of 0.000, indicating that variables X2 and Y are strongly correlated. This finding aligns with Haliq & Mahande (2025), who found that digital literacy plays a crucial role in enhancing students' writing skills through critical thinking, understanding information, and properly evaluating sources. Students with high digital literacy tend to find it easier to search for, understand, and develop ideas in the writing process, thereby boosting their self-confidence. The questionnaire results further reinforce this finding. Most students agree that they have the ability to search for relevant information, identify credible sources, evaluate information before using it, and develop ideas logically when writing paragraphs. In addition, a large number of respondents stated that they have the ability to use digital tools, including artificial intelligence (AI), responsibly without relying entirely on them. These abilities demonstrate strong digital literacy skills, which can help boost confidence in writing. This finding is supported by Getenet et al. (2024), who clarify that students' self-efficacy in the writing process is positively correlated with digital literacy. Students with good digital literacy skills tend to be more confident and "tech savvy," or able to understand and utilize technology effectively.

In addition, research by Efriza et al. (2026) found that digital literacy has a significant impact on students' writing skills. Students who exhibit a high level of digital literacy can use technology critically and effectively to support the writing process, such as searching for information, evaluating sources, and developing writing ideas. This study also explains that students who are proficient in digital literacy typically have greater confidence in learning Paragraph Writing. Another study conducted by Rodríguez-díaz & Rodríguez-ferrándiz (2026) also explains that digital literacy skills are closely related to critical thinking in evaluating digital information. Students with high digital literacy skills can use digital information responsibly.

This finding aligns with Gilster's (1997) theory of digital literacy, which explains that digital literacy is not only about the ability to use technology but also about using digital information effectively and critically. In this study, digital literacy was measured through several indicators, such as information literacy, critical thinking, technical skills, and digital ethics. Furthermore, this theory is also consistent with Bandura's (1997) theory, which suggests that students who possess the ability or experience to complete tasks tend to have high self-efficacy. Consequently, students with strong digital literacy are able to complete writing assignments independently, thereby enhancing their self-efficacy in the Paragraph Writing course.

C. Correlation between AI usage (X1), digital literacy (X2), and self-efficacy (Y)

The findings of the correlation test among the three variables using multiple correlation analysis display a coefficient of 0.662 with a significance level of 0.000, indicating that the three variables have a strong and significant correlation. These results indicate that AI usage, digital literacy, and self-efficacy, when considered together, are related to self-efficacy.

This suggests that the use of AI, supported by digital literacy, can enhance students' self-efficacy in the writing process. AI assists students in brainstorming, revising, checking

grammar, and developing ideas. Meanwhile, digital literacy helps students understand, evaluate, and use digital information effectively and critically. Students who can use AI appropriately and possess strong digital literacy tend to be more confident in completing Paragraph Writing assignments. This relationship is also reflected in the questionnaire results. Many students agreed that AI helps them generate ideas and revise their writing. They also stated that they are able to critically evaluate information, avoid plagiarism, and use their own ideas with the help of AI. They also stated that they believe they can apply their writing skills in various academic contexts. The results indicate that the combination of digital literacy and AI enhances students' self-efficacy in paragraph writing.

These findings are supported by the research of Baldrich et al. (2025), which explains that students use AI to assist with academic writing processes such as idea generation, text structuring, grammar correction, and text revision. The study explains that the use of AI in writing requires digital literacy so that students can understand, evaluate, and use digital information critically and ethically in the writing learning process in paragraph writing. Further research by Swari & Masluha (2025) shows that digital literacy and AI utilization simultaneously serve as strong predictors of students' writing proficiency. The results of this study indicate that AI helps students improve grammatical accuracy and lexical sophistication, while digital literacy serves as the cognitive foundation that enables students to evaluate information sources, understand digital ethics, and use technology effectively.

The results of this study align with Davis's (1989) Technology Acceptance Model (TAM), wherein students' AI engagement is driven by perceptions of Perceived Usefulness and Perceived Ease of Use. Gilster's (1997) digital literacy theory further posits that digital literacy transcends mere technological operation to encompass critical information processing, technical mastery, and ethical digital conduct. The results of this study indicate that when students cultivate and utilize both of these dimensions, they are more readily able to develop ideas and complete writing assignments effectively.

Bandura's (1997) self-efficacy theory conceptualizes personal efficacy beliefs through the dimensions of level, strength, and generality. The level dimension pertains to students' capacity to navigate writing challenges; the strength dimension concerns the robustness of their writing confidence; and the generality dimension reflects the breadth across which that confidence is applied. Students who harness AI tools and digital literacy resources tend to acquire richer learning experiences that progressively elevate their writing self-efficacy. Therefore, the stronger students' AI adoption and digital literacy competencies, the higher their self-efficacy in paragraph writing.

The results of this study found that the correlation between AI usage and self-efficacy is relatively weak, although statistically significant. This pattern is interpretable through the framework proposed by Davis (1998), namely Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Students engage AI because they recognize its functional utility in the writing process and value its accessibility. However, high levels of PU and PEOU do not necessarily translate into proportional self-efficacy gains, as the perceived benefits of AI relate primarily to task facilitation rather than to the internalization of writing competence. When AI mediates the writing process, students may complete assignments more efficiently without substantially deepening their own writing abilities.

CONCLUSION

Findings from this study confirm that statistically significant associations exist among AI adoption, digital literacy, and writing self-efficacy in the context of paragraph writing instruction. Digital literacy demonstrated a strong positive relationship with self-efficacy, while AI adoption showed a weaker yet significant association, indicating that although AI tools facilitate brainstorming, revision, grammar checking, and idea generation, they do not constitute the primary driver of writing confidence. Multiple correlation analysis established that the combined influence of digital literacy and AI adoption on self-efficacy is both strong and statistically significant. literacy showed a strong positive correlation with self-efficacy, digital literacy showed a strong positive correlation with self-efficacy, indicating that although AI helps students in brainstorming, revising, checking grammar, and developing ideas, AI is not the primary factor influencing their confidence in writing. Additionally, multiple correlation analysis found a significant and strong correlation between digital literacy and AI with self-efficacy.

Several limitations should be acknowledged. The generalizability of these findings is constrained by the exclusive focus on students enrolled in the Paragraph Writing course within the English Language Education Program at Muhammadiyah University of Surakarta. Additionally, questionnaire-based data may not fully capture the nuanced realities of respondents' actual experiences. Furthermore, the study establishes associative rather than causal relationships, and certain variables did not satisfy the normality assumption. The scope was also confined to AI adoption, digital literacy, and self-efficacy, without examining other factors that may influence students' confidence in writing.

To broaden the applicability of these findings, future investigations are encouraged to recruit larger and more heterogeneous samples spanning multiple institutions and educational levels. Subsequent research may also explore additional writing-related variables, including academic pressure, self-regulatory learning strategies, writing apprehension, motivational orientation, and English language proficiency. A more granular examination of AI's functional role in writing, encompassing specific use-cases such as idea generation, grammar assistance, editing, and brainstorming, is recommended to deepen the field's theoretical understanding of AI in paragraph writing instruction.

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