

Investigating the Relationship between ChatGPT and Writing Strategies

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ABSTRACT

Generative artificial intelligence (AI) tools such as ChatGPT provide immediate support for academic writing. However, concerns remain about whether students become dependent on AI rather than actively engaging in the writing process. Previous studies have examined technology adoption and academic writing strategies separately, leaving a gap in understanding how students' perceptions of ChatGPT affect their active writing strategies. Therefore, this quantitative study examined students' perceptions of ChatGPT. The study was guided by the Technology Acceptance Model (Davis, 1986) and the Cognitive Process Theory of Writing (Flower & Hayes, 1981). Data was collected from 222 participants using questionnaires. Descriptive statistics and correlational analysis were used to examine students' perceptions and the relationship between ChatGPT use and writing strategies. The findings indicate that students' acceptance and use of ChatGPT can coexist with active engagement in self-regulated writing processes. The study highlights the importance of using ChatGPT as an interactive learning support rather than a shortcut. Higher education institutions should guide students in using AI effectively while strengthening their metacognitive, cognitive, and effort-regulation writing strategies.

Keywords: ChatGPT, Writing Strategies, Generative tool, Active Engagement

INTRODUCTION

Background of Study

The rapid development of artificial intelligence (AI) has changed students' learning behaviors. ChatGPT is an AI tool that can support students by providing them with quick information, ideas, and guidance, thereby facilitating their learning activities (Youssef et al., 2024; Rahmat et al., 2026). Particularly in academic writing, ChatGPT can effectively assist students in generating ideas and strategies to improve writing

performance, as well as translating information and obtaining clarification based on user prompts. They examined ChatGPT relative to critical thinking abilities, academic achievement, ChatGPT usage and student engagement, illustrating its relevance to students' academic learning. However, the objective of ChatGPT as a tool to enhance student learning may only be realized if students take the initiative to evaluate and verify the AI-generated information rather than relying on it blindly.

Writing strategy is a critical component of academic writing because students need to actively manage the writing process. Flower and Hayes (1981) explain writing as a cognitive process involving planning, translating ideas into written text, and reviewing or revising the written work. Raaofi et al. (2017) examined writing strategies through metacognitive, effort regulation, cognitive, social and affective dimensions, providing a basis for understanding how learners manage academic writing tasks. These strategies reflect how students plan, monitor, regulate and develop their writing. In technology-supported learning, learners' strategies remain important because students need to actively manage their learning while using digital tools (Abdul Rahim et al., 2021; Abdul Rahim et al., 2023b). Therefore, understanding ChatGPT alongside learners' writing strategies is relevant as AI becomes increasingly integrated into academic writing. Therefore, the use of ChatGPT and student writing strategies needs to be balanced to provide accurate information to readers and ensure proper academic writing.

Statement of Problem

The increasing use of ChatGPT in academic writing has created both opportunities and challenges among learners. Although ChatGPT can provide immediate support, students must continue to engage actively in their learning and writing processes. Previous research has highlighted the importance of appropriate learning strategies in technology-supported learning environments. Abdul Rahim et al. (2021) reported that online learning has certain limitations and requires continuous strategies and momentum to support active and authentic learning. Similarly, Abdul Rahim et al. (2023) found that online reading requires practice, skills and additional strategies to support effective reading comprehension. In the context of AI-assisted academic writing, Rahmat et al. (2026) found that AI-assisted scaffolding not only supports academic writing development through learner engagement, agency and reduced affective barriers, but also raises concerns related to academic integrity, dependence and authenticity. These findings highlight an important concern about the possibility of students' overreliance on ChatGPT without active writing strategies. Overall, existing literature points to the importance of assessing whether students employ active writing strategies while using AI tools in academic writing.

In previous studies, ChatGPT and learners' strategies were examined from different perspectives. For instance, Youssef et al. (2024) focused on ChatGPT usage and students' academic learning, while Raaofi et al. (2017) examined writing strategies. In addition, Abdul Rahim et al. (2021) and Abdul Rahim et al. (2023b) highlighted the importance of learners' strategies in technology-supported learning environments. However, these studies do not directly examine learners' perceptions of ChatGPT and writing strategies, nor the relationship between the two within the same study. Therefore, the present study addresses this gap by examining these three areas. This provides a basis for understanding how learners perceive ChatGPT and writing strategies in academic writing, and whether a significant relationship exists between the two constructs. Consequently, the preceding discussion leads to the following research objectives and questions of this study.

Objective of the Study and Research Questions

This study is done to explore ChatGPT and its effect on writing strategy. Specifically, this study is done to answer the following questions;

- RQ1: How do learners perceive ChatGPT in academic writing?
- RQ2: How do learners report using writing strategies in academic writing?
- RQ3: Is there a significant relationship between learners' perceptions of ChatGPT and their reported writing strategies?

H01: There is no statistically significant relationship between learners' perceptions of ChatGPT and their reported writing strategies.

LITERATURE REVIEW

Theoretical Framework of the Study

Technology Acceptance Model (Davis, 1986) and ChatGPT

The Technology Acceptance Model (TAM), developed by Davis (1986), provides a theoretical basis for understanding learners' acceptance and use of ChatGPT in academic writing. TAM proposes that technology adoption is primarily influenced by perceived usefulness and perceived ease of use. In the context of this study, perceived usefulness can be reflected in the extent to which learners view ChatGPT as supporting academic activities such as generating ideas, obtaining writing guidance, improving productivity and facilitating learning, while perceived ease of use relates to learners' experience of ChatGPT as an accessible and engaging tool. Youssef et al. (2024) further demonstrated the relevance of ChatGPT to students' academic learning through its relationship with critical thinking, academic achievement, usage and student engagement. Therefore, TAM provides an appropriate theoretical lens for examining learners' perceptions of ChatGPT and understanding how their acceptance of the technology may relate to the writing strategies they employ in academic writing.

Cognitive Process Theory of Writing (Flower & Hayes, 1981)

The Cognitive Process Theory of Writing, proposed by Flower and Hayes (1981), offers a useful framework for understanding how students use ChatGPT in their academic work. Rather than seeing writing as a simple linear path, this model views it as a fluid process made up of three key elements: the task environment, the writer's memory, and the core writing stages of planning, drafting, and revising. Within this setup, ChatGPT acts as an external tool in the student's task environment, offering support during critical thinking stages. For example, in the planning phase which involves brainstorming and organizing ideas, ChatGPT can suggest topic outlines or preliminary concepts, lightening the mental load required to get started. When drafting and revising, students can use the AI to refine their wording, clarify points, and evaluate their text, making it easier to translate thoughts into clear prose while building confidence in their work. Ultimately, using ChatGPT alongside this model shows how generative AI can handle routine tasks like initial brainstorming and basic editing, freeing up mental space for students to focus on deeper critical thinking and synthesis.

Past Studies on ChatGPT and Writing Strategy

Youssef et al. (2024) examined ChatGPT usage among 353 university students in the UAE using a survey-based quantitative approach. The study investigated ChatGPT usage, student engagement, critical thinking and academic achievement. The findings showed that ChatGPT usage was associated with students' engagement, critical thinking and academic achievement, suggesting that ChatGPT can support academic learning. Rahmat et al. (2026) reviewed 23 studies on AI-assisted academic writing using a systematic literature review approach. The findings showed that AI can support learners' engagement and writing development, but its use should remain a scaffold for learning rather than a replacement for learners' own processes. Together, these studies indicate that AI can support academic learning and writing when learners remain actively involved.

Raaofi et al. (2017) developed and validated a writing-strategy scale among 322 undergraduate students using questionnaire data and factor analysis. The study identified five writing-strategy dimensions: metacognitive, effort regulation, cognitive, social and affective strategies. These dimensions provide a useful basis for examining how learners manage their academic writing. Compared with Youssef et al. (2024) and Rahmat et al. (2026), which focused mainly on AI and learning, Raofi et al. (2017) focused on learners' writing processes. Therefore, the studies provide complementary perspectives on AI use and writing strategies.

Overall, previous studies show that ChatGPT can support academic learning and writing, while writing strategies help learners manage the writing process. However, these areas have generally been examined separately. Therefore, the present study brings the two areas together by examining learners' perceptions of ChatGPT, their perceptions of writing strategies and the relationship between ChatGPT and writing strategy. This provides a basis for understanding how learners use AI while maintaining their own writing strategies in academic writing.

Conceptual Framework of the Study

Figure 1 presents the conceptual framework for examining the effect of ChatGPT on students' writing strategies. The framework is anchored by the Technology Acceptance Model (TAM) developed by Davis (1986), which posits that users' acceptance of a technology is influenced by its perceived usefulness and perceived ease of use. In the context of this study, ChatGPT is viewed as an educational technology that supports students throughout the writing process by providing feedback, generating ideas, and facilitating learning engagement. Rahmat et al. (2026) argue that ChatGPT encourages learner engagement, making it a valuable tool for enhancing students' participation in academic writing activities. Accordingly, the ChatGPT construct is measured using the instrument developed by Youssef et al. (2024), which includes the dimensions of critical thinking utilities, academic achievement, ChatGPT usage, and student engagement.

The dependent variable, writing strategy, is grounded in the Cognitive Process Theory of Writing proposed by Flower & Hayes (1981). This theory conceptualizes writing as a recursive cognitive activity involving planning, translating ideas into text, and revising. The theory supports the notion that effective writing requires the use of multiple strategies that regulate cognitive and affective processes. Consistent with this perspective, writing strategies are measured using the instrument developed by Raoofi et al. (2017), which consists of four dimensions: metacognitive, effort regulation, cognitive, and social-affective strategies. The framework therefore proposes that students' use of ChatGPT influences their writing strategies, with the interaction between technology adoption and cognitive writing processes contributing to improved academic writing performance.

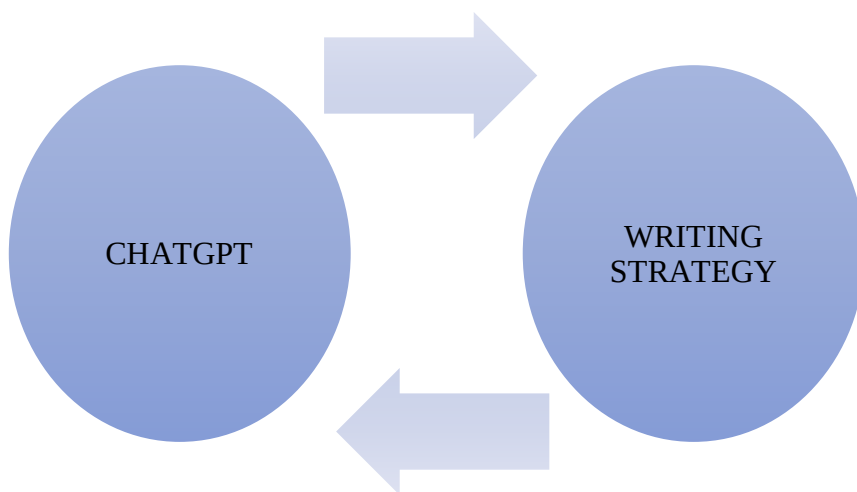


Figure 1. Conceptual Framework of the Study

ChatGPT and Its Effect on Writing Strategy

METHODOLOGY

This quantitative study is done to explore ChatGPT and its effect on writing strategy. A convenient sample of 222 participants responded to the survey. The instrument used is a 5 Likert-scale survey and is rooted from Raoofi,et.al (2017) and Youssef,et.al (2024) to reveal the variables in table 2 below. Table 1 below shows the

categories used for the Likert scale; 1 is for Never, 2 is for Rarely, 3 is for Sometimes, 4 is for Often and 5 is for Always.

Table 1- Likert Scale Use

1	Never
2	rarely
3	Sometimes
4	Often
5	Always

Table 2- Distribution of Items in the Survey

SECTION	VARIABLE	CONSTRUCT	NO OF ITEMS/ INDICATORS	
B	WRITING STRATEGY Raoofi, et.al (2017)	Metacognitive	10	27(.954)
		Effort Regulation	4	
		Cognitive	6	
		Social	4	
		Affective	3	
C	CHAT GPT Youssef,et.al.(2024)	Critical thinking abilities	4	16 (.941)
		Academic achievement	4	
		ChatGPT usage	5	
		Student engagement	3	
				43(.968)

Table 3- Reliability Levels, Cronbach's Alpha Ranges, and Their Interpretations

Reliability Level	Cronbach's Alpha range	Interpretation
Excellent	0.9 and above	Indicates very high internal consistency
Good	0.80-0.89	Reflects strong internal consistency
Acceptable	0.70-0.79	Indicates acceptable internal consistency
Questionable	0.60-0.69	Reflects questionable internal consistency
Poor	Below 0.6	Indicates poor internal consistency

In order to determine the internal reliability of the instrument, reliability analysis is conducted. Table 3 above shows the distribution and interpretation of Cronbach Alpha range. According to Ahmad,et.al. (2024), Cronbach Alpha scores between 0.7 to 0.9 is considered acceptable to excellent.

Table 2 also shows the reliability of the survey. The analysis shows a Cronbach alpha of .954 for Writing Strategies and .941 for ChatGPT. The overall Cronbach's Alpha for all 43 items is .968; thus, revealing a good reliability of the instrument chosen/used. Further analysis using SPSS is done to present findings to answer the research questions for this study. The item distribution reported in the methodology totals 27 writing-strategy items (10 metacognitive, 4 effort-regulation, 6 cognitive, 4 social, and 3 affective) and 16 ChatGPT items, for 43 items overall.

However, the Appendix lists five effort-regulation items, making 28 writing-strategy items and 44 items overall. The reported analyses and reliability coefficients correspond to the 27-item/43-item totals; the additional effort-regulation item in the Appendix is therefore flagged for author verification before publication. It should not be assumed to have been included in the analysis without checking the dataset and scoring syntax.

FINDINGS

Demographic Analysis

In academic research, demographic data is reported to establish representativeness, thereby allowing generalizability of the findings to a larger population (Zienefuss, et al., 2021). Reporting the figures in percentages offers a clear and understandable picture of the sample makeup, and hence provides a useful overview of participants' characteristics. Table 4 presents the demographic profile of the participants in this study.

Table 4- Percentage for Demographic Profile

Question	Demographic Profile	Categories	Percentage (%)
1	Gender	Male	33%
		Female	67%
2	Location of Study	Malaysia	34%
		Outside Malaysia	66%
3	Level of Study	Diploma	12%
		Degree	58%
		Postgraduate	30%
4	Mode of Study	100% face-to-face classes	35%
		100% online classes	4%
		A mixture of online and face-to-to-face classes	61%

As shown in Table 4, female participants comprised the majority of the sample at 67%, while males accounted for the remaining 33%. Geographically, the majority of respondents were studying outside Malaysia (66%), compared to 34% located within the country. Academically, over half of the cohort was enrolled in degree programs (58%), followed by postgraduate students (30%) and diploma students (12%). Regarding instructional delivery, a blended approach was most prevalent, with 61% utilizing a mixture of online and face-to-face classes, whereas 35% attended fully face-to-face classes and a small minority (4%) studied entirely online.

Descriptive Statistics

Findings for ChatGPT

This section presents data to answer research question 3: How do learners perceive ChatGPT in academic writing? In the context of this study, this is measured by (i) critical thinking abilities, (ii) academic achievements, (iii) ChatGPT usage and (iv) student engagement.

Table 5- Mean (M) and Standard deviation (SD) for CRITICAL THINKING ABILITIES (CT)

ITEM	M	SD
CTQ1 I usually need clarification on the precision and reliability of information provided by ChatGPT, which enhances my critical thinking skills.	3.96	0.90
CTQ2 ChatGPT's responses made me doubt their validity, leading me to seek further clarification or evidence.	3.81	0.93
CTQ3 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.	3.93	0.90
CTQ4I need clarification about the accuracy of ChatGPT's output, which often encourages me to evaluate the information and conduct additional research independently.	3.99	0.93

Table 5 shows that learners generally perceived ChatGPT positively in relation to critical thinking abilities, with mean scores ranging from 3.81 to 3.99. The highest mean was recorded for the need to clarify the accuracy of ChatGPT's output, which encouraged learners to evaluate the information and conduct additional research independently ($M = 3.99$, $SD = 0.93$). This was followed by the need to clarify the precision and reliability of information provided by ChatGPT ($M = 3.96$, $SD = 0.90$), and the exploration of alternative viewpoints or sources ($M = 3.93$, $SD = 0.90$). The lowest mean was recorded for doubting the validity of ChatGPT's responses and seeking further clarification or evidence ($M = 3.81$, $SD = 0.93$). Overall, the findings suggest that learners did not necessarily accept ChatGPT-generated information without evaluation; rather, its use was accompanied by verification, clarification and further exploration of information.

Table 6- Mean (M) and Standard deviation (SD) for ACADEMIC ACHIEVEMENTS (AA)

ITEM	M	SD
AAQ1 ChatGPT brings innovative ideas that are ready to be shared with student.	3.95	0.92
AAQ2 Students can anticipate robust writing guidance from ChatGPT.	3.91	0.90
AAQ3 ChatGPT has improved my academic performance.	3.71	0.97
AAQ4 ChatGPT has improved my learning pace.	3.97	0.84

Table 6 portrays that learners generally perceived ChatGPT positively in relation to their academic achievement, with mean scores ranging from 3.71 to 3.97. The highest mean was recorded for ChatGPT improving learners' learning pace ($M = 3.97$, $SD = 0.84$), followed by its ability to provide innovative ideas that can be shared with students ($M = 3.95$, $SD = 0.92$) and provide writing guidance ($M = 3.91$, $SD = 0.90$). The lowest mean was recorded for the statement that ChatGPT had improved academic performance ($M = 3.71$, $SD = 0.97$). Overall, the findings suggest that learners perceived ChatGPT more strongly as a tool that facilitates the learning and writing process than as a tool that directly improves academic performance.

Table 7- Mean (M) and Standard deviation (SD) for CHATGPT USAGE (CU)

ITEM	M	SD
CUQ1 ChatGPT is a state-of-the-art writing model that is favorably used today.	3.85	0.98
CUQ2 Students seek help from ChatGPT's assistance in composing essays and articles.	3.87	0.93
CUQ3 ChatGPT helps students in English language translation.	3.99	0.95
CUQ4 Employing ChatGPT significantly improves human productivity.	3.73	1.03
CUQ5 The use of ChatGPT marks a groundbreaking transformation in writers' capabilities.	3.72	0.96

Table 7 describes that learners generally reported frequent use and positive perceptions of ChatGPT for academic-related purposes, with mean scores ranging from 3.72 to 3.99. The highest mean was recorded for ChatGPT helping students with English language translation ($M = 3.99$, $SD = 0.95$), followed by seeking ChatGPT's assistance in composing essays and articles ($M = 3.87$, $SD = 0.93$) and perceiving ChatGPT as a state-of-the-art writing model that is favourably used today ($M = 3.85$, $SD = 0.98$). Comparatively lower means were recorded for improving human productivity ($M = 3.73$, $SD = 1.03$) and transforming writers' capabilities ($M = 3.72$, $SD = 0.96$). Overall, the findings suggest that learners perceived ChatGPT more strongly for specific and practical academic functions, particularly translation and writing assistance, than for broader claims concerning productivity and the transformation of writing capabilities.

Table 8 - Mean (M) and Standard deviation (SD) for STUDENT ENGAGEMENT (SE)

ITEM	M	SD
SEQ1 ChatGPT is more interactive, human-like, and engaging for the students.	3.70	1.00
SEQ2 ChatGPT increases confidence in my ability to conduct research/to search for materials	3.76	0.96
SEQ3 ChatGPT is easy to use and more engaging for me	3.96	0.92

As shown in Table 8, respondents reported positive overall perceptions of student engagement with ChatGPT, with all items means exceeding 3.70 on a 5-point scale. The highest-rated aspect was the tool's ease of use and engagement $M=3.96$, $SD=0.92$, followed closely by its ability to increase students' confidence in conducting

research and searching for materials $M=3.76$, $SD=0.96$. Finally, students also agreed that ChatGPT is interactive, human-like, and engaging $M=3.70$, $SD=1.00$. Overall, the low standard deviations across all items indicate consistent agreement among students regarding ChatGPT's positive impact on their academic engagement.

Findings for Writing Strategies

This section presents data to answer research question 4: How do learners perceive the use of writing strategies in academic writing? In the context of this study, this is measured by (i) metacognitive, (ii) effort regulation, (iii) cognitive, (iv) social and (v) Affective strategies.

Table 9- Mean (M) and Standard deviation (SD) for MTEACOGNITIVE (MWS)

ITEM	M	SD
MWSQ 1 I organize my ideas prior to writing.	3.86	1.07
MWSQ 2 I revise my writing to make sure that it includes everything I want to discuss in my writing.	4.03	0.96
MWSQ 3 I check my spelling.	4.20	0.94
MWSQ 4 I check my writing to make sure it is grammatically correct.	4.15	0.96
MWSQ 5 I evaluate and re-evaluate the ideas in my essay.	4.02	0.93
MWSQ 6 I monitor and evaluate my progress in writing.	4.01	0.96
MWSQ 7 I revise and edit an essay two or more times before I hand it in to my teacher.	3.99	1.00
MWSQ8 I go through the planning stages in my writing.	3.94	0.91
MWSQ9 I go through the drafting stages in my writing.	3.96	1.01
MWSQ10 I go through the revising and editing stages in my writing.	3.48	1.06

Table 9 indicates that learners used metacognitive writing strategies for spell-checking ($M = 4.20$, $SD = 0.94$), indicating that learners often monitored the accuracy of their spelling, with relatively consistent responses. In contrast, going through the revising and editing stages in writing ($M = 3.48$, $SD = 1.06$) recorded the lowest mean, indicating that this strategy was used less frequently than the other metacognitive strategies, with slightly greater variation in responses. Overall, the findings suggest that learners placed greater emphasis on checking the accuracy of their writing than on the broader process of revising and editing.

Table 10- Mean (M) and Standard deviation (SD) for EFFORT REGULATION (ERS)

ITEM	M	SD
ERSQ 1I write a lot to develop my writing skills.	3.48	10.6
ERSQ 2I often work hard to do well in my writing even if I don't like English writing tasks.	3.81	1.04
ERSQ 3Even if the writing activities are difficult, I don't give up but try to engage in them.	3.97	0.97
ERSQ 4I concentrate as hard as I can when doing a writing task.	4.09	0.91

Table 10 shows that learners frequently used effort-regulation strategies in academic writing, concentrating as hard as possible when doing English writing tasks ($M = 4.09$, $SD = 0.91$), indicating that they often maintained their concentration during writing tasks, with relatively consistent responses. In contrast, writing a lot to develop writing skills ($M = 3.48$, $SD = 1.06$) recorded the lowest mean, indicating that learners engaged less frequently in regular writing practice to develop their skills, with slightly greater variation in responses. Overall, the findings suggest that learners demonstrated stronger concentration during writing tasks than during regular writing practice for skill development.

Table 11- Mean (M) and Standard deviation (SD) for COGNITIVE (CWS)

ITEM	M	SD
CWSQ1 I use memorized grammatical elements such as singular and plural forms, verb tenses, prefixes and suffixes, etc, in my writing	3..88	0.97
CWSQ 2I put newly memorized vocabulary in my sentences.	3.74	0.99

CWSQ 3In order to generate ideas for my writing, I usually engage myself in brainstorming.	3.74	1.00
CWSQ 4I use different words that have the same meaning.	3.79	0.99
CWSQ 5I use my experiences and knowledge in my writing.	4.05	0.88
CWSQ 6I try to use effective linking words to ensure clear and logical relationship between sentences or paragraphs	3.98	0.91

Table 11 shows that learners used cognitive writing strategies by using their experiences and knowledge in writing ($M = 4.05$, $SD = 0.88$), indicating that learners often relied on their existing knowledge and experiences when developing their writing, with relatively consistent responses. The lowest means were recorded for putting newly memorised vocabulary into sentences ($M = 3.74$, $SD = 0.99$) and using brainstorming to generate ideas ($M = 3.74$, $SD = 1.00$). These results indicate that these strategies were used less frequently than using existing knowledge, although the means still suggest frequent use. Overall, learners relied more on existing knowledge and experiences than on newly memorised vocabulary and brainstorming.

Table 12 - Mean (M) and Standard Deviation (SD) for -SOCIAL (SWS)

ITEM	M	SD
SWSQ1 In order to generate ideas for my writing, I usually discuss the writing topic with a friend or classmate.	3.76	1.01
SWSQ 2After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it.	3.63	1.02
SWSQ 3I try to identify friends or classmates whom I can ask for help in my writing.	3.72	1.04
SWSQ 4 When I have trouble writing my essay, I try to do it with my classmates or friends.	3.72	0.99

Table 12 indicates that learners used social writing strategies in academic writing, with mean scores ranging from 3.63 to 3.76. The highest mean was recorded for discussing a writing topic with a friend or classmate to generate ideas ($M = 3.76$, $SD = 1.01$). This was followed by identifying friends or classmates for writing assistance ($M = 3.72$, $SD = 1.04$) and working with classmates or friends when experiencing difficulties in writing ($M = 3.72$, $SD = 0.99$). The lowest mean was recorded for asking a friend or classmate to read and comment on an essay after revision and editing ($M = 3.63$, $SD = 1.02$). Overall, the findings suggest that learners were more inclined to seek peer interaction during idea generation and when encountering writing difficulties than to obtain peer feedback after completing the revision and editing process.

Table 13-. Mean (M) and Standard deviation (SD) for AFFECTIVE (AWS)

ITEM	M	SD
AWSQ1I try to write an essay in class with confidence and ease	3.66	1.00
AWSQ2I try to relax whenever I feel afraid of writing.	3.91	0.94
AWSQ3I encourage myself to write even when I am afraid of making mistakes	3.92	0.99

Table 13 indicates that learners frequently used affective strategies to manage their emotions during academic writing. The highest mean was recorded for encouraging them to continue writing despite being afraid of making mistakes ($M = 3.92$, $SD = 0.99$), closely followed by trying to relax when feeling afraid of writing ($M = 3.91$, $SD = 0.94$). In comparison, writing an essay in class with confidence and ease recorded the lowest mean ($M = 3.66$, $SD = 1.00$). Overall, the findings suggest that learners actively regulated negative emotions associated with writing, particularly fear and concern about making mistakes, although their level of confidence and ease when writing in class was comparatively lower.

Exploratory Statistics

According to He (2024), correlation is a statistical technique that shows how strongly two variables are related to each other or the degree of association between the two. It's a common tool for describing simple relationships without making a statement about cause and effect. This section presents data to answer research question on correlation. According to He (2024), coefficient is significant at the .05 level and positive

correlation is measured on a 0.1 to 1.0 scale. Weak positive correlation would be in the range of 0.1 to 0.3, moderate positive correlation from 0.3 to 0.5, and strong positive correlation from 0.5 to 1.0.

Findings for Relationship between ChatGPT and Writing Strategy

This section addresses RQ3: Is there a significant relationship between learners' perceptions of ChatGPT and their reported writing strategies?

H03: There is no statistically significant relationship between learners' perceptions of ChatGPT and their reported writing strategies.

To determine if there is a significant association in the mean scores between ChatGPT and Writing Strategy, data is analyzed using SPSS for correlations. Results are presented separately in Table 14 below.

Table 14- Correlation between ChatGPT and Writing Strategy

		CHATGPT
WRITING STRATEGIES	Pearson Correlation	.749**
	Sig. (2-tailed)	<.001
	N	222
CHATGPT	Pearson Correlation	1
	Sig. (2-tailed)	
	N	222

** . Correlation is significant at the 0.01 level (2-tailed).

Table 14 indicates a strong positive association between the composite ChatGPT score and the writing-strategy score, Pearson's $r = .749$, $p < .001$, $N = 222$. The value is reported as $p < .001$ rather than $p = .000$ because a statistical significance value should not be presented as exactly zero. The result provides evidence against H03 and supports an association between the two measured scores. It does not demonstrate that ChatGPT causes changes in writing strategies, nor does it establish the direction of any relationship.

CONCLUSION

Summary of Findings and Discussions

The findings show that learners have very positive perceptions of ChatGPT as a tool for academic writing. Students particularly appreciated that ChatGPT is easy to use and interact with. They also felt that it increased their confidence when conducting research and searching for academic materials. However, students gave the lowest rating to the idea of ChatGPT as a human-like or conversational partner. This suggests that students value ChatGPT mainly for its practical usefulness rather than its human-like qualities.

These findings are consistent with Youssef et al. (2024), who found that the use of ChatGPT among university students can improve engagement, critical thinking, and academic performance. Similarly, the high level of student satisfaction supports the findings of Rahmat et al. (2026), whose systematic review showed that AI-assisted tools can support students during writing tasks by making the process easier and reducing difficulties and anxiety.

The findings also show that students rely on different writing strategies when completing academic writing tasks. They understand that good writing requires more than simply drafting ideas. Students need to organise their ideas, manage their effort, and review and improve their writing.

This finding is consistent with the framework developed by Raoofi et al. (2017), which identified five main writing strategies used by undergraduate students: metacognitive, effort regulation, cognitive, social, and affective strategies. While previous studies such as Youssef et al. (2024) and Rahmat et al. (2026) focused

mainly on the support provided by AI, the findings for RO2 show that students still play an active role in managing and controlling their own writing process.

Implications and Suggestions for Future Research

Theoretical and Conceptual Implications

The findings can be interpreted through the Technology Acceptance Model (TAM), the Cognitive Process Theory of Writing (CPT), and the writing-strategy framework of Raoofi et al. (2017), while recognizing that the study did not test a causal model. TAM's perceived usefulness is conceptually relevant to items concerning writing guidance, ideas, learning pace, and perceived academic benefits. Perceived ease of use is most directly represented by the student-engagement item stating that ChatGPT is easy to use. Other measured dimensions—critical-thinking abilities, academic achievement, ChatGPT usage, and student engagement—are related to perceptions and use, but they are not all direct measures of TAM's two core beliefs. The significant positive correlation does not show that ChatGPT increases independence or that it causes students to use writing strategies.

The findings also show that ChatGPT does not replace students' own thinking and writing efforts. Instead, it can make some parts of the writing process easier and allow students to focus more on important tasks such as planning, drafting, reviewing, and improving their work. This supports Raoofi et al.'s (2017) framework, particularly in the areas of effort regulation and metacognitive planning. Therefore, ChatGPT should not be seen simply as a shortcut for academic writing, but as a tool that can support students while they remain actively involved in managing and controlling their own writing process.

Pedagogical Implications

The study suggests that students are actively using ChatGPT to support their academic writing. Therefore, universities should not simply ban or ignore AI tools. Instead, teaching and assessment should be adjusted to help students use AI responsibly. Lecturers should focus on writing as a process, not only on the final written product. For example, students can be asked to show how they developed their ideas, used ChatGPT, revised their work, and reflected on the changes they made. This allows lecturers to assess students' actual thinking and writing process.

As for the students, they should be taught how to use ChatGPT effectively and critically. Lecturers can teach students how to write clear prompts to get useful feedback, develop ideas, consider different arguments, and improve their writing. At the same time, students need AI literacy, including the ability to check the accuracy of AI-generated information and identify possible errors. Therefore, ChatGPT can be used as a learning support tool while students remain responsible for their own thinking, decisions, and academic work.

Suggestions for Future Research

Future research should further explore how students use ChatGPT in academic writing. Researchers could use qualitative or mixed-method approaches, such as interviews or think-aloud sessions, to better understand how students think and make decisions when using ChatGPT. Long-term studies also could examine whether continued use of ChatGPT improves students' independent writing skills or makes them too dependent on AI. This would provide a clearer understanding of the long-term effects of AI on academic writing.

Future studies could also compare students from different fields of study, such as Humanities, STEM, or Law, to determine whether their use of ChatGPT and writing strategies differ. In addition, as AI technology continues to develop, researchers should examine how new and more advanced AI features affect students' higher-level thinking, planning, and writing strategies. These studies would provide a better understanding of how AI can be used effectively while maintaining students' own cognitive and writing abilities.

Limitations. The study used a convenience sample of 222 respondents, including participants studying in and outside Malaysia. The sampling frame, recruitment channels, response rate, and inclusion criteria are not

specified in the reported methodology; accordingly, representativeness and generalizability cannot be assumed. The cross-sectional self-report design may also be affected by response and common-method biases. Pearson correlation identifies the strength and direction of a linear association, but does not establish causality, temporal order, or the absence of confounding variables. These limitations should be considered when interpreting the findings.

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APPENDIX

Writing Strategies & Chat Gpt

This instrument is adapted from Raoofi,et.al (2017) and Youssef,et.al (2024)

Frequency

1	Never			
2	rarely			
3	Sometimes			
4	Often			
5	Always			
SECTION	VARIABLE	CONSTRUCT	NO OF ITEMS/ INDICATORS	
B	WRITING STRATEGY Raoofi, et.al (2017)	Metacognitive	10	28
		Effort Regulation	5	
		Cognitive	6	
		Social	4	
		Affective	3	
C	CHAT GPT Youssef,et.al.(2024)	Critical thinking abilities	4	16
		Academic achievement	4	
		ChatGPT usage	5	
		Student engagement	3	
				44

Section B-Writing Strategies

Mteacognitive (Mws)

ITEM	1	2	3	4	5
MWSQ 1 I organize my ideas prior to writing.					
MWSQ 2 I revise my writing to make sure that it includes everything I want to discuss in my writing.					
MWSQ 3 I check my spelling.					
MWSQ 4 I check my writing to make sure it is grammatically correct.					
MWSQ 5 I evaluate and re-evaluate the ideas in my essay.					
MWSQ 6 I monitor and evaluate my progress in writing.					
MWSQ 7 I revise and edit an essay two or more times before I hand it in to my teacher.					
MWSQ8 I go through the planning stages in my writing.					
MWSQ9 I go through the drafting stages in my writing.					
MWSQ10 I go through the revising and editing stages in my writing.					

Effort Regulation (Ers)

ITEM	1	2	3	4	5
ERSQ 1I write a lot to develop my writing skills.					
ERSQ 2I often work hard to do well in my writing even if I don't like English writing tasks.					
ERSQ 3Even if the writing activities are difficult, I don't give up but try to engage in them.					

ERSQ 4I concentrate as hard as I can when doing a writing task.					
ERSQ I spend a lot of time and energy on writing good English assignments.					

Cognitive (Cws)

ITEM	1	2	3	4	5
CWSQ1 I use memorized grammatical elements such as singular and plural forms, verb tenses, prefixes and suffixes, etc, in my writing					
CWSQ 2I put newly memorized vocabulary in my sentences.					
CWSQ 3In order to generate ideas for my writing, I usually engage myself in brainstorming.					
CWSQ 4I use different words that have the same meaning.					
CWSQ 5I use my experiences and knowledge in my writing.					
CWSQ 6I try to use effective linking words to ensure clear and logical relationship between sentences or paragraphs					

Part 5-Social (Sws)

ITEM	1	2	3	4	5
SWSQ1 In order to generate ideas for my writing, I usually discuss the writing topic with a friend or classmate.					
SWSQ 2After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it.					
SWSQ 3I try to identify friends or classmates whom I can ask for help in my writing.					
SWSQ 4 When I have trouble writing my essay, I try to do it with my classmates or friends.					

Part 6-Affective (Aws)

ITEM	1	2	3	4	5
AWSQ1I try to write an essay in class with confidence and ease					
AWSQ2I try to relax whenever I feel afraid of writing.					
AWSQ3I encourage myself to write even when I am afraid of making mistakes					

Section B-Chatgpt

Critical Thinking Abilities (Ct)

ITEM	1	2	3	4	5
CTQ1 I usually need clarification on the precision and reliability of information provided by ChatGPT, which enhances my critical thinking skills.					
CTQ2 ChatGPT's responses made me doubt their validity, leading me to seek further clarification or evidence.					
CTQ3 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.					
CTQ4I need clarification about the accuracy of ChatGPT's output, which often encourages me to evaluate the information and conduct additional research independently.					

Academic Achievements (Aa)

ITEM	1	2	3	4	5
AAQ1 ChatGPT brings innovative ideas that are ready to be shared with student.					
AAQ2 Students can anticipate robust writing guidance from ChatGPT.					
AAQ3 ChatGPT has improved my academic performance.					
AAQ4 ChatGPT has improved my learning pace.					

Chatgpt Usage (Cu)

ITEM	1	2	3	4	5
CUQ1 ChatGPT is a state-of-the-art writing model that is favorably used today.					
CUQ2 Students seek help from ChatGPT's assistance in composing essays and articles.					
CUQ3 ChatGPT helps students in English language translation.					
CUQ4 Employing ChatGPT significantly improves human productivity.					
CUQ5 The use of ChatGPT marks a groundbreaking transformation in writers' capabilities.					

Student Engagement (Se)

ITEM	1	2	3	4	5
SEQ1 ChatGPT is more interactive, human-like, and engaging for the students.					
SEQ2 ChatGPT increases confidence in my ability to conduct research/to search for materials					
SEQ3 ChatGPT is easy to use and more engaging for me					
SEQ4 ChatGPT helps and shares my educational burden in the best possible manner.					