The Use of ChatGPT in Academic Writing: Perspectives from Undergraduate Students in Malaysian Public University

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ABSTRACT

Academic writing necessitates the deployment of various metacognitive, effort regulation, cognitive, social, and affective strategies. Recently, the integration of artificial intelligence, specifically ChatGPT, has emerged as a digital scaffold designed to guide and assist writers through the composing process. This quantitative study aims to explore the utilization of ChatGPT as an academic scaffold and investigate its correlational relationship with the writing strategies employed by learners. Employing a quantitative survey design, data were collected utilizing a 43-item, 5-point Likert-scale instrument divided into two primary constructs: Writing Strategies and ChatGPT usage. A convenience sample of 95 undergraduate students from Universiti Teknologi MARA (UiTM) Perak Branch participated in the study. Correlation analyses indicated a significant positive association between ChatGPT usage and overall writing strategies. Specifically, a medium positive correlation was identified between ChatGPT usage and metacognitive ($r = .358$), effort regulation ($r = .419$), cognitive ($r = .385$), and affective ($r = .491$) writing strategies. Conversely, a weak positive correlation was observed concerning social writing strategies ($r = .273$). These findings carry pertinent pedagogical implications, suggesting that higher education practitioners should systematically integrate AI scaffolding into writing instruction to enhance self-regulated learning and writing behaviors.

Keywords: Academic Writing; ChatGPT Integration; Digital Scaffolding; Writing Strategies; Correlational Analysis.

INTRODUCTION

Background of Study

Academic writing is a multifaceted endeavour that requires learners to continuously navigate complex composing processes. To successfully progress through these stages, writers heavily depend on their inherent knowledge of writing strategies. A routine yet demanding aspect of this process is the necessity to synthesize and paraphrase information from external texts, which requires adept paraphrasing skills. While some writers become accustomed to this routine, others frequently struggle with the cognitive load of academic composition. Consequently, students must actively employ self-regulated methods to manage their writing tasks effectively.

To overcome these writing challenges, learners utilize specific, categorizable strategies. According to Raoofi et al. (2017), academic writers rely on metacognitive, effort regulation, cognitive, social, and affective strategies to guide their writing process. Recently, the educational landscape has experienced a paradigm shift with the integration of generative artificial intelligence, as ChatGPT is nowadays increasingly being utilized to scaffold writing. In this context, ChatGPT acts as a digital scaffold for the writer, providing necessary guidance through dynamic prompts and immediate assistance. Furthermore, research by Youssef et al. (2024) indicates that utilizing ChatGPT and navigating its outputs directly impacts learners' critical thinking abilities. Despite the extensive

existing literature on traditional composing strategies, the rapid integration of artificial intelligence into higher education makes this specific intersection highly relevant. As students increasingly turn to AI tools to assist in composing essays and academic articles, it is crucial to understand how these modern digital scaffolds interact with established human writing strategies.

The continuous evolution of Natural Language Processing capabilities implies that the mechanisms by which learners regulate their effort, cognition, and affect during writing are fundamentally shifting. Therefore, exploring how learners perceive their use of ChatGPT and investigating its correlational relationship with traditional writing strategies remains a vital area of ongoing academic inquiry.

Statement of Problem

Current academic literature emphasizes that writers depend heavily on their knowledge of writing strategies to navigate the complex composing process. According to Raoofi et al. (2017), students employ a multidimensional approach when they write, utilizing metacognitive, effort regulation, cognitive, social, and affective strategies. Despite familiarity with these approaches, academic writing remains challenging, particularly when tasks require distinct skills such as paraphrasing external texts. To overcome these inherent challenges, the educational landscape has seen a rapid integration of generative artificial intelligence, with ChatGPT being used extensively to scaffold writing.

Writers increasingly depend on ChatGPT to guide them through various parts of the writing process, utilizing the AI as a digital scaffold for continuous prompts and assistance. However, this rapid adoption presents complex issues regarding student engagement and cognitive effort. Recent findings by Youssef et al. (2024) indicate that the use of ChatGPT directly impacts learners' critical thinking abilities and academic achievement. The core issue lies in navigating the tension between active self-regulated learning and passive reliance on AI; it is crucial to determine if students are utilizing these digital scaffolds to enhance their writing strategies or simply offloading the cognitive burden. Addressing this dynamic is vital for contemporary higher education. While studies have thoroughly validated traditional writing strategy scales, a clear research gap remains in understanding how these specific strategy dimensions interact with modern AI usage. Recent conclusions indicate a pressing need to continuously evaluate the evolving relationship between AI assistance and student productivity, highlighting the necessity to investigate the correlational dynamics between the two.

Consequently, this study is conducted to address this gap by exploring academic writing and ChatGPT as scaffolds. Specifically, this research aims to explore how ChatGPT scaffolds writers' use of writing strategies by answering several key research questions. It investigates how learners perceive their use of metacognitive, effort regulation, cognitive, social, and affective writing strategies , alongside their perceptions of using ChatGPT in writing. Ultimately, the study seeks to determine if there is a significant relationship between ChatGPT usage and these established writing strategies , testing the null hypothesis that no such significant relationship exists.

Objective of the Study and Research Questions

This study is done to explore academic writing and ChatGPT as scaffolds. Specifically, this study is done to answer the following questions;

- How do learners perceive their use of metacognitive writing strategies?
- How do learners perceive their use of effort regulation writing strategies?
- How do learners perceive their use of cognitive writing strategies?
- How do learners perceive their use of social writing strategies?
- How do learners perceive their use of affective writing strategies?
- How do learners perceive their use of ChatGPT in writing?
- Is there a significant relationship between ChatGPT and writing strategies?

$H_{01:}$ There is no significant relationship between ChatGPT and writing strategies

LITERATURE REVIEW

Theoretical Framework of the Study

- **Scaffolding in Learning and ChatGPT**

Scaffolding in educational theory traditionally refers to the temporary, structured support provided to learners to help them achieve a goal they cannot accomplish independently. In contemporary digital learning environments, this concept has evolved; nowadays, the use of ChatGPT has been used to scaffold writing. When learners encounter cognitive hurdles during complex composing tasks, writers depend on ChatGPT to guide them towards some parts of the writing process. In this framework, rather than entirely taking over the task, ChatGPT acts as a scaffold for the writer to be guided by prompts and assistance. This continuous loop of digital feedback and interaction shapes the learner's cognitive engagement with their work. Consequently, understanding this dynamic is crucial, as according to Youssef et al. (2024), the use of ChatGPT impacts learners' critical thinking abilities.

- **Writing Strategies (Raoofi,et.al., 2017)**

The theoretical underpinning of the composing process dictates that writers depend on their knowledge of writing strategies to go through the composing process. According to Raoofi et al. (2017), writers use strategies such as metacognitive, effort regulation, cognitive, social, and affective strategies when they write. The application of these specific strategies is particularly vital for complex academic tasks; for instance, academic writers often need to have the ability to paraphrase information from another text to be include in their writing. This requires paraphrasing skills (Rahmat, 2021). For many writers, this is a routine they have become accustomed to while others may struggle during paraphrasing. Consequently, a robust reliance on these categorized strategies allows students to actively manage their cognitive load and overcome the complex hurdles inherent in academic composition.

Past Studies

- **Past Studies on Writing and ChatGPT**

Many studies have been done to investigate the various cognitive strategies learners use during the composing process, as well as the academic challenges they face in ESL writing. The study by Khairuddin et al. (2021) is done to investigate the use of rhetorical strategies by good and poor writers in argumentative essays. This research is about identifying how different writers utilize the rhetorical elements of Logos, Ethos, and Pathos during the writing process. The respondents were Malaysian students. There were two participants selected for this specific think-aloud and coding study. The instrument employed was written essays, specifically writing on the topic of whether examinations should be abolished. The findings indicated that both writers utilized the three rhetorical elements differently and were considerate to the readers, but they did not focus on their roles as writers. The implications of this study are that teachers need to help students familiarize themselves with rhetorical strategies to enhance their academic writing skills. Next, the study by Rahmat (2021) also looked at cognitive and metacognitive strategies in ESL writing. This research is about exploring the specific aspects of cognitive and metacognitive strategies that a writer uses to paraphrase. The respondents were ESL writers who went through a semester of an academic writing class. The study utilized purposely random chosen respondents. The instrument used was a survey to elicit responses regarding their writing process. The findings revealed that writers consciously and unconsciously use components of cognitive and metacognitive strategies to paraphrase. The implications of this study bear interesting consequences for the teaching and learning of academic writing, highlighting the inherent complexity of paraphrasing routines.

The study by Youssef et al. (2024) is done to investigate the effects of ChatGPT usage on students' academic learning and achievement. This research is about the impacts of using ChatGPT among university students on their overall learning experience and critical thinking. The respondents are university students located in Ajman, UAE. The exact number of respondents is part of a larger descriptive survey sample across human and applied sciences. The instrument employed was a 24-item questionnaire utilizing a 5-point Likert scale. The findings revealed that using ChatGPT had a significantly positive impact on students' engagement, critical thinking

abilities, and academic achievement. The implications of this study emphasize the need for transparent governance, equitable access, and faculty capacity-building to ensure pedagogical integrity when using AI. Next, a recent study published in the Hungarian Educational Research Journal (2025) also looked at academic performance and self-regulated learning skills. This research is about the effects of ChatGPT-flipped instruction on L2 learners. The respondents were L2 pre-service teachers in Ondo State, Nigeria. The sample involved over 140 students assigned to different instruction levels. The instrument used involved post-test scoring and multivariate analysis. The findings revealed a significant positive effect of ChatGPT-flipped instruction on both academic performance and self-regulated learning compared to traditional methods. The implications of this study suggest that ChatGPT integration enables learners to actively construct knowledge, receive immediate feedback, and should be incorporated into the core English education curriculum.

In summary, the main ideas from past studies establish that students actively utilize specific metacognitive, cognitive, and rhetorical strategies to navigate complex academic writing tasks, while more recent literature confirms that the integration of digital AI tools like ChatGPT significantly enhances academic performance, critical thinking, and self-regulated learning behaviors. They said that traditional writing strategies are crucial and that AI tools independently boost student engagement; however, this current study posits that these two domains are now fundamentally interconnected within the modern composing process. Therefore, this study expands on these findings by exploring how ChatGPT specifically acts as an active digital scaffold, directly correlating AI usage with learners' metacognitive, effort regulation, cognitive, social, and affective writing strategies.

Conceptual Framework of the Study

Figure 1 shows the conceptual framework of the study. This study explores the use of ChatGPT as a scaffold in academic writing. Writers depend on their knowledge of writing strategies to go through the composing process (Khairuddin, et.al, 201) . According to Raoofi et al. (2017), writers use strategies such as metacognitive, effort regulation, cognitive, social, and affective strategies when they write. Often, academic writers need to have the ability to paraphrase information from another text to be include in their writing. This requires paraphrasing skills (Rahmat, 2021). For many writers, this is a routine they have become accustomed to while others may struggle during paraphrasing. Nowadays, the use of ChatGPT has been used to scaffold writing. Writers depend on ChatGPT to guide them towards some parts of the writing process. ChatGPT acts as a scaffold for the writer to be guided by prompts and assistance. According to Youssef et al. (2024), the use of ChatGPT impacts learners' critical thinking abilities. This study therefore explores how ChatGPT scaffolds writers use of writing strategies.

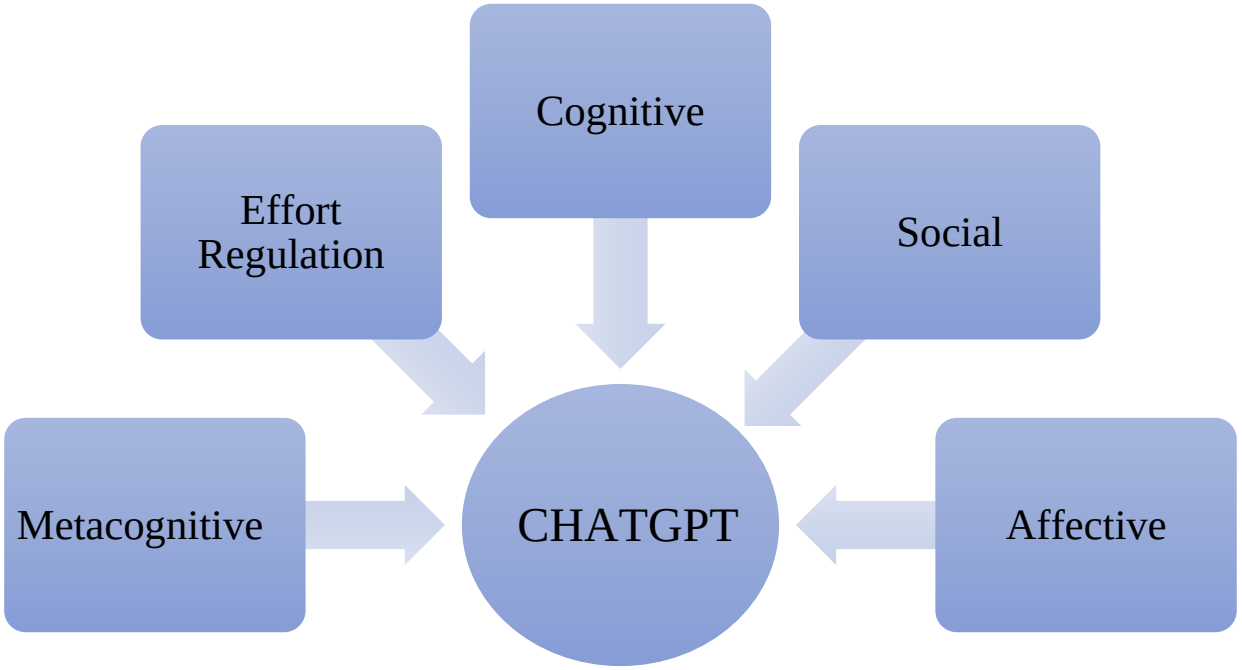

Figure 1- Conceptual Framework of the Study

METHODOLOGY

This quantitative study is done to explore the writing process and ChatGPT. A convenient sample of 95 participants responded to the survey. The instrument (refer to Table 2) used is a 5-Likert-scale survey. It is adopted from Raoofi et al. (2017) for writing ; Youssef et al. (20 24) for ChatGPT. Table 1 below shows the categories used for the Likert scale; 1 is for Never, 2 is for Raely, 3 is for Sometimes, 4 is for Oftne and 5 is for Always.

Table 1- Likert Scale Use

1	Never
2	rarely
3	Sometimes
4	Often
5	Always

Table 2 - 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

Table 3- Distribution of Items in the Survey

SECTION	VARIABLE	CONSTRUCT	NO OF ITEMS/ INDICATORS	Items	Cronbach Alpha
B	WRITING STRATEGY Raoofi, et.al (2017)	Metacognitive	10		.892
		Effort Regulation	4		.702
		Cognitive	6		.847
		Social	4		.866
		Affective	3		.809
C	CHAT GPT Youssef,et.al.(2024)	Critical thinking abilities	4	16	.925
		Academic achievement	4		
		ChatGPT usage	5		
		Student engagement	3		
				43	.943

Table 3 provides a comprehensive overview of the survey's structural composition, detailing how the items are methodologically distributed across two main sections. Section B, functioning to assess the "Writing Strategy" variable, adopts a validated scale from Raoofi et al. (2017) and encompasses a total of 27 indicators. This section is further delineated into five specific theoretical constructs: Metacognitive (10 items), Effort Regulation (4 items), Cognitive (6 items), Social (4 items), and Affective strategies (3 items). Concurrently, Section C evaluates the "ChatGPT" variable, utilizing an adapted scale from Youssef et al. (2024) . This segment comprises 16 distinct indicators stratified across four dimensions: Critical thinking abilities (4 items), Academic achievement (4 items), ChatGPT usage (5 items), and Student engagement (3 items). Cumulatively, the instrument synthesizes these established measures to form a comprehensive 43-item questionnaire designed for rigorous empirical data collection.

In addition to the item distribution, Table 3 also shows the reliability of the survey. The analysis is based on the information in Table 2, which reveals the reliability levels by Ahmad et.al (2024). The analysis shows a Cronbach alpha of .892 for metacognitive, .702 for effort regulation, .847 for cognitive, .866 for social, and .809 for affective writing strategies, .925 for ChatGPT. The overall Cronbach Alpha for all 43 items is .943; 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.

FINDINGS

Demographic Analysis

According to Zienefuss, et.al (2021), multiple research report demographic data in percentages to establish sample representatives, and allow for generalizability to a larger population. The reporting also provides an overview of participants' characteristics. Percentages offer a clear and understandable picture of the sample makeup.

Table 4- Percentage for Demographic Profile

Question	Demographic Profile	Categories	Percentage (%)
1	Gender	Male	32%
		Female	68%
2	Level	Diploma	79%
		Degree	21%

Table 4 outlines the demographic characteristics of the sampled population, providing essential context to establish sample representativeness and facilitate generalizability. Methodological reporting of these distributions in percentages offers a transparent and coherent overview of the structural makeup of the participants. Regarding gender distribution among the N=95 respondents, the sample is predominantly female, accounting for 68% of the cohort, while male participants constitute the remaining 32%. In terms of academic status, the vast majority of the respondents are enrolled at the Diploma level, representing 79% of the total sample, whereas undergraduate Degree students comprise a smaller subset at 21%. This stratified baseline data ensures that subsequent analyses regarding writing strategies and AI scaffolding are interpreted with a clear understanding of the specific student profiles at Universiti Teknologi MARA (UiTM) Perak Branch.

Descriptive Statistics

Why is there a need to report the mean and standard deviation? According to Vetter (2017), Mean (M) represents the average, or centre of a data set. Standard deviation (SD) indicates the typical distance of individual observations from the mean which shows the data's variability or spread. A low SD means the data points are clustered close to the mean whole a high. SD indicates they are more spread out. It is good to have a high SD.

Findings for Metacognitive Writing Strategies

This section presents data to answer research question 1: How do learners perceive their use of metacognitive writing strategies?

Table 5- Mean(M) and Standard Deviation(SD) for PLANNING STAG- METACOGNITIVE (MWS)

ITEM	M	SD
MWSQ 1 I organize my ideas prior to writing.	3.77	0.75
MWSQ 2 I revise my writing to make sure that it includes everything I want to discuss in my writing.	4.12	0.67
MWSQ 3 I check my spelling.	4.23	0.84
MWSQ 4 I check my writing to make sure it is grammatically correct.	4.24	0.77
MWSQ 5 I evaluate and re-evaluate the ideas in my essay.	3.79	0.77

MWSQ 6 I monitor and evaluate my progress in writing.	3.73	0.87
MWSQ 7 I revise and edit an essay two or more times before I hand it in to my teacher.	3.94	0.91
MWSQ8 I go through the planning stages in my writing.	3.79	0.85
MWSQ9 I go through the drafting stages in my writing.	3.76	0.98
MWSQ10 I go through the revising and editing stages in my writing.	3.89	0.81

Table 5 presents the descriptive statistics, including mean (M) and standard deviation (SD), evaluating how learners perceive their deployment of metacognitive writing strategies (MWS). The empirical data reveals that students demonstrate a high propensity for self-monitoring and mechanical accuracy during the writing process, as evidenced by the highest mean scores observed in item MWSQ 4 ("I check my writing to make sure it is grammatically correct"; M = 4.24, SD = 0.77) and item MWSQ 3 ("I check my spelling"; M = 4.23, SD = 0.84). Similarly, a strong emphasis on substantive revision is indicated by item MWSQ 2 ("I revise my writing to make sure that it includes everything I want to discuss..."; M = 4.12, SD = 0.67). Conversely, the lowest mean score within this construct was recorded for item MWSQ 6 ("I monitor and evaluate my progress in writing"; M = 3.73, SD = 0.87), closely followed by item MWSQ 9 regarding navigating the drafting stages (M = 3.76, SD = 0.98). The standard deviations across all items remain relatively low, with the lowest variability found in item MWSQ 2 (SD = 0.67), indicating a high degree of consensus among the N=95 undergraduate participants regarding their structural and mechanical metacognitive behaviours.

Findings for Effort Regulation Writing Strategies

This section presents data to answer research question 2: How do learners perceive their use of effort regulation writing strategies?

Table 6- Mean(M) and Standard Deviation(SD) for EFFORT REGULATION (ERS)

ITEM	M	SD
ERSQ 1I write a lot to develop my writing skills.	3.37	0.79
ERSQ 2I often work hard to do well in my writing even if I don't like English writing tasks.	3.88	0.74
ERSQ 3Even if the writing activities are difficult, I don't give up but try to engage in them.	4.04	0.76
ERSQ 4I concentrate as hard as I can when doing a writing task.	4.20	0.74

Table 6 presents the descriptive statistics for the Effort Regulation Writing Strategies (ERS) construct, detailing the mean (M) and standard deviation (SD) scores derived from the sample. The empirical data demonstrates that the respondents exhibit a high level of psychological investment and determination when executing academic tasks, as evidenced by the highest mean score recorded for item ERSQ 4 ("I concentrate as hard as I can when doing a writing task"; M = 4.20, SD = 0.74). Academic persistence is further substantiated by item ERSQ 3 ("Even if the writing activities are difficult, I don't give up but try to engage in them"; M = 4.04, SD = 0.76). Conversely, the lowest mean configuration was observed for item ERSQ 1 ("I write a lot to develop my writing skills"; M = 3.37, SD = 0.79), indicating that while students exert high concentration and resilience during active assignments, they engage less frequently in voluntary, extensive writing practice. The standard deviations remain uniformly low and tightly clustered between 0.74 and 0.79, reflecting a strong consensus and minimal data variability among the undergraduate participants regarding their effort regulation behaviors.

Findings for Cognitive Writing Strategies

This section presents data to answer research question 3: How do learners perceive their use of cognitive writing strategies?

B. Table 7- Mean(M) and Standard Deviation(SD) for TRANSLATING STAGE-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	3.87	0.88
CWSQ 2I put newly memorized vocabulary in my sentences.	3.79	0.89

CWSQ 3In order to generate ideas for my writing, I usually engage myself in brainstorming.	3.86	0.85
CWSQ 4I use different words that have the same meaning.	3.98	0.89
CWSQ 5I use my experiences and knowledge in my writing.	4.21	0.78
CWSQ 6I try to use effective linking words to ensure clear and logical relationship between sentences or paragraphs	3.99	0.82

Table 7 outlines the descriptive statistics for the Translating Stage-Cognitive Writing Strategies (CWS) construct, detailing the mean (M) and standard deviation (SD) configurations for each indicator. The empirical data illustrates that learners rely heavily on internal resource activation during textual composition, as demonstrated by the highest mean score recorded for item CWSQ 5 ("I use my experiences and knowledge in my writing"; M = 4.21, SD = 0.78). Students also display a strong commitment to structural cohesion and lexical variety, with high mean scores observed for item CWSQ 6 regarding the use of effective linking words (M = 3.99, SD = 0.82) and item CWSQ 4 regarding the deployment of words with similar meanings (M = 3.98, SD = 0.89). Conversely, the lowest mean score within this cognitive domain was registered for item CWSQ 2 ("I put newly memorized vocabulary in my sentences"; M = 3.79, SD = 0.89). The standard deviations remain uniformly low, with the lowest data variability found in item CWSQ 5 (SD = 0.78), indicating a robust consensus among the N=95 undergraduate participants regarding their cognitive processing behaviors during composition.

Findings for Social Writing Strategies

This section presents data to answer research question 4: How do learners perceive their use of social writing strategies?

(A) Table 8- 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.	3.62	0.95
SWSQ 2After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it.	3.37	1.06
SWSQ 3I try to identify friends or classmates whom I can ask for help in my writing.	3.63	1.06
SWSQ 4 When I have trouble writing my essay, I try to do it with my classmates or friends.	3.69	1.08

Table 8 presents the descriptive statistics for the Social Writing Strategies (SWS) construct, detailing the mean (M) and standard deviation (SD) scores for each indicator. The data reveals that learners moderately engage in collaborative behaviors when facing academic difficulties, with the highest mean score observed in item SWSQ 4 ("When I have trouble writing my essay, I try to do it with my classmates or friends"; M = 3.69, SD = 1.08). This is followed closely by peer identification efforts in item SWSQ 3 ("I try to identify friends or classmates whom I can ask for help in my writing"; M = 3.63, SD = 1.06) and peer brainstorming in item SWSQ 1 (M = 3.62, SD = 0.95). Conversely, the lowest mean score was recorded for item SWSQ 2 ("After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it"; M = 3.37, SD = 1.06), suggesting that students are less inclined to seek peer feedback during the final evaluation stages of their writing. Notably, the standard deviations for this construct are higher compared to other strategy domains, with the greatest variability found in item SWSQ 4 (SD = 1.08). This higher dispersion indicates a greater lack of consensus among the N=95 undergraduate participants regarding their reliance on social writing strategies.

Findings for Affective Writing Strategies

This section presents data to answer research question 5: How do learners perceive their use of affective writing strategies?

(B) Table 9- Mean(M) and Standard Deviation(SD) for AFFECTIVE (AWS)

ITEM	M	SD
AWSQ1I try to write an essay in class with confidence and ease	3.88	0.76

AWSQ2I try to relax whenever I feel afraid of writing.	3.97	0.80
AWSQ3I encourage myself to write even when I am afraid of making mistakes	4.17	0.81

Table 9 details the descriptive statistics for the Affective Writing Strategies (AWS) construct, outlining the mean (M) and standard deviation (SD) metrics across the evaluated indicators. The empirical findings demonstrate that the participants possess a high degree of self-motivation and psychological resilience, as highlighted by the highest mean score in item AWSQ 3 ("I encourage myself to write even when I am afraid of making mistakes"; M = 4.17, SD = 0.81). Students also exhibit active emotional regulation and anxiety-management behaviors during composition, which is reflected in the high mean score for item AWSQ 2 ("I try to relax whenever I feel afraid of writing"; M = 3.97, SD = 0.80). Conversely, the lowest mean configuration, albeit still relatively high, was observed for item AWSQ 1 ("I try to write an essay in class with confidence and ease"; M = 3.88, SD = 0.76). The standard deviations remain uniformly low and tightly clustered between 0.76 and 0.81, indicating a strong consensus and minimal data dispersion among the N=95 undergraduate respondents regarding their affective coping mechanisms during the writing process.

Findings for ChatGPT in writing

This section presents data to answer research question 6: How do learners perceive their use of ChatGPT in writing? In the context of this study, this is measured by (i) Critical Thinking abilities, (ii) academic achievement, ChatGPT usage, and (iv)student engagement.

(i) Table 10- 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.	3.59	0.96
CTQ2 ChatGPT's responses made me doubt their validity, leading me to seek further clarification or evidence.	3.82	0.79
CTQ3 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.	3.92	0.77
CTQ4I need clarification about the accuracy of ChatGPT's output, which often encourages me to evaluate the information and conduct additional research independently.	3.93	0.73

Table 10 outlines the descriptive statistics for the Critical Thinking Abilities (CT) construct, detailing the mean (M) and standard deviation (SD) scores derived from the dataset. The empirical data demonstrates that the perceived limitations or ambiguities in AI outputs serve as a catalyst for independent verification, as evidenced by the highest mean score recorded for item CTQ 4 ("I need clarification about the accuracy of ChatGPT's output, which often encourages me to evaluate the information and conduct additional research independently"; M = 3.93, SD = 0.73). This self-directed validation behavior is further supported by item CTQ 3 ("I actively explore alternative viewpoints or sources of information when using ChatGPT..."; M = 3.92, SD = 0.77). Conversely, the lowest mean configuration within this dimension was observed for item CTQ 1 ("I usually need clarification on the precision and reliability of information provided by ChatGPT, which enhances my critical thinking skills"; M = 3.59, SD = 0.96). The standard deviations remain relatively low, with the lowest data dispersion found in item CTQ 4 (SD = 0.73), indicating a strong consensus among the N=95 undergraduate participants that navigating ChatGPT's outputs actively stimulates their evaluative and critical thinking processes.

(ii) Table 11- Mean(M) and Standard Deviation(SD) for ACADEMIC ACHIEVEMENTS (AA)

ITEM	M	SD
AAQ1 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.	3.82	0.77
AAQ2 ChatGPT brings innovative ideas that are ready to be shared with students.	3.86	0.91
AAQ3 Students can anticipate robust writing guidance from ChatGPT.	3.68	0.82
AAQ4 ChatGPT has improved my academic performance.	3.99	0.67

Table 11 presents the descriptive statistics for the Academic Achievements (AA) construct, presenting the mean (M) and standard deviation (SD) metrics for each indicator. The empirical data indicates that learners perceive a strong positive impact of generative AI on their educational outcomes, highlighted by the highest mean score recorded for item AAQ 4 ("ChatGPT has improved my academic performance"; M = 3.99, SD = 0.67). This perceived improvement is complemented by item AAQ 2, which reflects the platform's capacity to deliver innovative, shareable ideas (M = 3.86, SD = 0.91). Conversely, the lowest mean configuration within this dimension was registered for item AAQ 3 ("Students can anticipate robust writing guidance from ChatGPT"; M = 3.68, SD = 0.82). Notably, the lowest data variability is found in item AAQ 4 (SD = 0.67), demonstrating a high degree of consensus among the N=95 undergraduate participants that utilizing ChatGPT directly enhances and optimizes their overall academic performance.

(iii) Table 12- Mean(M) and Standard Deviation(SD) for CHATGPT USGAE (CU)

ITEM	M	SD
CUQ1 ChatGPT is a state-of-the-art writing model that is favorably used today.	3.71	0.87
CUQ2 Students seek help from ChatGPT's assistance in composing essays and articles.	3.79	0.76
CUQ3 ChatGPT helps students in English language translation.	3.84	0.83
CUQ4 Employing ChatGPT significantly improves human productivity.	3.41	1.04
CUQ5 The advent of ChatGPT marks a groundbreaking transformation in Natural Language Processing capabilities.	3.51	0.89

Table 12 presents the descriptive statistics for the ChatGPT Usage (CU) construct, displaying the mean (M) and standard deviation (SD) scores calculated for each indicator. The empirical data highlights that learners frequently deploy the platform for specialized linguistic and compositional support, as demonstrated by the highest mean score in item CUQ 3 ("ChatGPT helps students in English language translation"; M = 3.84, SD = 0.83), closely followed by item CUQ 2 regarding seeking assistance for composing essays and articles (M = 3.79, SD = 0.76). Conversely, the lowest mean score within this dimension was recorded for item CUQ 4 ("Employing ChatGPT significantly improves human productivity"; M = 3.41, SD = 1.04). Notably, item CUQ 4 also exhibited the highest standard deviation (SD = 1.04), which reveals a substantial dispersion in the data. This high variability indicates a notable lack of consensus among the N=95 undergraduate participants regarding the direct impact of ChatGPT usage on overall human productivity.

(iv) Table 13- 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.	3.42	0.98
SEQ2 ChatGPT increases confidence in my ability to conduct research/to search for materials	3.56	1.02
SEQ3 ChatGPT is easy to use and more engaging for me	3.73	1.03

Table 13 presents the descriptive statistics for the Student Engagement (SE) construct, displaying the mean (M) and standard deviation (SD) metrics for each indicator. The empirical findings indicate that the user-friendly nature of the platform serves as a primary driver for student involvement, as evidenced by the highest mean score recorded for item SEQ 3 ("ChatGPT is easy to use and more engaging for me"; M = 3.73, SD = 1.03). This is followed by item SEQ 2, which indicates that the tool moderately enhances learners' confidence in their research and material sourcing capabilities (M = 3.56, SD = 1.02). Conversely, the lowest mean configuration within this dimension was observed for item SEQ 1 ("ChatGPT is more interactive, human-like, and engaging for the students"; M = 3.42, SD = 0.98). Notably, the standard deviations across all items are relatively high, with the highest variability found in item SEQ 3 (SD = 1.03). This wider data dispersion reflects a notable lack of consensus among the N=95 undergraduate participants regarding the extent to which ChatGPT stimulates their academic engagement.

Exploratory Statistics (correlation)

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.

Findings for Relationship between ChatGPT and writing strategies

This section presents data to answer research question 7: Is there a significant relationship between ChatGPT and writing strategies?

$H_{01:}$ There is no significant relationship between ChatGPT and writing strategies

To determine if there is a significant association in the mean scores between ChatGPT and writing strategies data is anlaysed using SPSS for correlations. Results are presented separately in table 14 below.

Table 14- Correlation between ChatGPT and writing strategies

		Metacognitive	Effort Regulation	Cognitive	Social	Affective
ChatGPT	Pearson (Correlation	.358**	.419**	.385**	.273**	.491**
	Sig (2-tailed)	<.001	<.001	<.001	<.001	<.001
	N	95	95	95	95	95

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

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.

Table 14 shows there is an association between ChatGPT and writing strategies. There is medium positive relationship between ChatGPT and metacognitive (r=.358**)., effort regulation(r=.419**). , cognitive (r=.385**), and affective (r=.491**). writing strategies. However, there is a weak positive relationship between ChatGPT and affective writing strategies (r=.273**).

CONCLUSION

Summary of Findings and Discussions

The first objective of this study was to examine how undergraduate learners perceive their use of various writing strategies during the academic composing process. The descriptive analysis revealed that across the five strategy dimensions proposed by Raoofi et al. (2017), students demonstrated a clear prioritization of internal cognitive monitoring and individual effort over external or social support mechanisms. Within the metacognitive domain, learners exhibited a strong adherence to mechanical and surface-level editing—specifically prioritizing grammatical corrections and spelling verification—while being less inclined to continuously evaluate their overarching drafting progress. This heavy emphasis on grammatical precision aligns with the findings of Rahmat (2021), who observed that ESL writers frequently engage conscious metacognitive mechanisms to manage linguistic accuracy when dealing with complex academic tasks. Furthermore, the empirical results from the effort regulation and cognitive strategy dimensions demonstrated that students possess high academic resilience and rely extensively on personal knowledge activation. Participants reported maximum exertion of concentration during active tasks and a strong propensity to utilize their past experiences and background knowledge to translate ideas into text. This strong reliance on internal resources mirrors the assertions of Khairuddin et al. (2021), who established that successful writers depend heavily on strategic knowledge and personal rhetorical resources to navigate the cognitive demands of essay composition.

Interestingly, the lowest strategic engagement across the entire writing inventory was observed within the social writing strategies construct. Students reported a notable reluctance to seek peer feedback or collaborate on revisions after thoroughly editing their drafts. This indicates that while learners are highly self-motivated and emotionally resilient—as substantiated by the high scores in the affective domain where students actively encouraged themselves despite a fear of making mistakes—they predominantly view academic writing as an

isolated, individual endeavor rather than a collaborative process. This hesitation to engage in peer-led evaluation underscores a pedagogical gap where students prefer solitary cognitive processing over social scaffolding, preferring to internalize the writing challenge rather than seeking external validation from their classmates.

The second objective of this study was to investigate learners' perceptions regarding the use of ChatGPT as a digital scaffold in their academic writing routines. The findings indicated an overwhelmingly positive perception of ChatGPT's utility, primarily categorized by its direct contributions to perceived academic achievement and its linguistic capabilities in translation and essay composition. Students strongly agreed that utilizing the generative AI tool directly improved their overall academic performance and served as a valuable resource for English language support. This positive reception of AI as a performance enhancer is in strict accordance with the empirical evidence presented by Youssef et al. (2024), which established that the strategic integration of ChatGPT significantly improves student engagement and yields favorable academic outcomes.

However, the analysis also revealed a crucial nuance in how students interact with this technology, particularly within the critical thinking dimension. The highest levels of agreement were associated with items indicating that students frequently doubted the accuracy, precision, and validity of ChatGPT's outputs. Rather than leading to passive reliance, these perceived ambiguities acted as a cognitive catalyst, actively encouraging learners to evaluate the AI-generated information, explore alternative viewpoints, and conduct independent secondary research. This behavior provides robust empirical support for the theoretical framework of digital scaffolding, demonstrating that ChatGPT does not completely offload the student's cognitive burden, but instead functions as an interactive scaffold that triggers evaluative processing. This pattern of active knowledge construction and verification strongly corroborates the findings of recent literature regarding ChatGPT-flipped instruction (Hungarian Educational Research Journal, 2025), which concluded that when AI tools provide immediate feedback, they actively stimulate self-regulated learning skills and critical evaluation rather than fostering cognitive passivity.

Implications and Suggestions for Future Research

Theoretical and Conceptual Implications

The findings of this study offer significant theoretical and conceptual insights by bridging the gap between traditional self-regulated writing frameworks and contemporary digital scaffolding. Conceptually, the study validates the multidimensional writing strategy scale proposed by Raoofi et al. (2017), demonstrating that learners still actively deploy internal metacognitive, cognitive, effort-driven, and affective strategies when composing. Crucially, however, the results reshape the traditional understanding of social and external scaffolding by integrating the digital dimension introduced by Youssef et al. (2024). Instead of utilizing social writing strategies through peer collaboration, contemporary learners pivot toward ChatGPT as an automated, non-human writing scaffold. Theoretically, this redefines the traditional zone of proximal development, proving that AI does not create cognitive passivity or complete task offloading. Rather, because students maintain a healthy skepticism regarding the accuracy of AI outputs, the interaction functions as an active cognitive catalyst that triggers independent evaluation and secondary verification, thereby expanding the conceptual boundaries of self-regulated learning in digital ecosystems.

Pedagogical Implications

From a pedagogical perspective, the clear interaction between student writing strategies and AI usage dictates a necessary shift in how academic writing is instructed in higher education. Since learners are already heavily dependent on ChatGPT for linguistic translation, idea generation, and structural guidance, educators should transition away from punitive AI prohibitions and move toward structured AI integration. Writing instructors should explicitly teach "critical AI literacy," guiding students on how to use generative tools as preliminary digital scaffolds while intentionally cross-checking facts, analyzing biases, and verifying external sources. Furthermore, given that the findings revealed exceptionally low engagement in social writing strategies and a reluctance to seek peer feedback, pedagogy must change to intentionally blend human and machine interaction. Instructors should design hybrid writing activities where students use ChatGPT for drafting but are required to engage in peer-review workshops for final evaluations, ensuring that technical scaffolding does not completely replace vital human collaborative learning.

Suggestions for Future Research

While this study illuminates the correlational dynamics between writing strategies and ChatGPT usage, several avenues remain open for future empirical investigation. First, future researchers should expand the demographic scope beyond the undergraduate Diploma and Degree students at a single institution to include postgraduate writers or professional academics, exploring how advanced writing expertise alters reliance on AI scaffolds. Second, because this study relied on a cross-sectional quantitative survey design, future investigations would benefit from a longitudinal or mixed-methods approach, utilizing qualitative interviews, screen-recording protocols, or think-aloud methods to capture the real-time, step-by-step cognitive processes of students as they interact with ChatGPT prompts. Finally, future studies should conduct comparative or experimental research to measure actual writing performance outcomes, directly testing whether students who utilize ChatGPT-assisted writing strategies achieve significantly higher academic writing scores than those utilizing traditional, non-assisted composition methods.

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APPENDIX

WRITING STRATEGIES & CHAT GPT

(Adapted from Raoofi, et. al, 2017, and Youssef, et. al ; 2024)

SECTION B-WRITING STRATEGIES

(i) MTEACOGNITIVE (MWS)

ITEM
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.

(ii) EFFORT REGULATION (ERS)

ITEM
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.

(iii) COGNITIVE (CWS)

ITEM
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
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
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

(v) CRITICAL THINKING ABILITIES (CT)

ITEM
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.

(vi) ACADEMIC ACHIEVEMENTS (AA)

ITEM
AAQ1 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.
AAQ2 ChatGPT brings innovative ideas that are ready to be shared with students.
AAQ3 Students can anticipate robust writing guidance from ChatGPT.
AAQ4 ChatGPT has improved my academic performance.

(vii) CHATGPT USGAE (CU)

ITEM
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 advent of ChatGPT marks a groundbreaking transformation in Natural Language Processing capabilities.

(viii) STUDENT ENGAGEMENT (SE)

ITEM
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