Reframing Academic Writing with Chatgpt: A Self-Determination Theory Approach

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ABSTRACT

The emergence of Artificial Intelligence (AI) tools like ChatGPT is changing the nature of academic writing by providing support in generating ideas, developing content, revision and editing. Although writing with AI offers benefits, little is known about its impact on learners' writing strategies and motivation. Guided by Self-Determination Theory (SDT), this study examines the relationship between competence, autonomy, and relatedness in academic writing in the context of ChatGPT usage. This quantitative study involved 126 respondents from higher educational institutions. A 43-item Likert-scale questionnaire adapted from Raoofi et al. (2017) and Youssef et al. (2024) was used to collect data. The questionnaire was based on three constructs: autonomy, relatedness, and competence and showed high internal consistency (Cronbach's $\alpha = .937$). Data were analysed using descriptive, inferential, and correlation analyses in SPSS. Results show positive perceptions of using ChatGPT in improving academic achievement, critical thinking skills, and the motivation of students. Moreover, participants used metacognitive, cognitive, and effort-regulating writing strategies frequently. ChatGPT is a potential scaffold for supporting learners' writing development, but it also motivates them by increasing their competence, autonomy, and relatedness.

Keywords: Artificial Intelligence (AI), ChatGPT, Academic Writing, Writing Strategies Motivation

INTRODUCTION

Background of Study

AI-assisted or AI-powered tools are software that uses artificial intelligence technologies. These technologies include Machine Learning, Natural Language Processing (NLP), and Large Language Models (LLMs) that create, support, enhance, or automate human tasks. AI-assisted or AI-powered writing tools such as ChatGPT, Grammarly, and Microsoft Copilot, on the other hand, are software applications that aid users in generating content, outlining, writing, revising, editing, and performing other writing tasks and skills based on given prompts and suggestions. In essence, AI-assisted or AI-powered tools refer to the idea of imitating human cognitive activities by machines.

The rapid development of AI has introduced us to numerous AI-powered tools widely used in education, such as Grammarly, QuillBot, Copilot, Gemini, Claude, and Jenni AI. The introduction of ChatGPT in November 2022, for example, has created a brand-new frontier, taking the world by surprise, in demonstrating that artificial intelligence can provide human-like assistance in generating ideas, providing information, and even in crafting grammatically correct phrases and sentences. AI-assisted tools help individuals with various tasks, including

brainstorming ideas, expanding content, and providing additional informational support (ChatGPT, Copilot, Gemini, Claude, Jenni AI), as well as enhancing language use, such as correcting grammar, summarising, and paraphrasing (Quillbot and Grammarly). There are other valuable AI-powered offerings that provide more focused and specific writing assistance and functions; among them are Elicit for writing literature reviews, SciSpace for citations, and Zotero and Mendeley for organising and managing research materials. Many of these tools operate on the concept of Generative AI, which means they centre on generating new content rather than analysing and manipulating pre-existing data (Bhat, 2025).

The use of AI-powered tools in education has now become a common practice. Students and writers alike use AI-powered tools because they are easily available and help to expedite their writing process, making the task faster and easier to manage.

Academic writing has previously relied on independent composing and manual revision and editing. It can be said that academic writing used to be more tedious because it relied heavily on one's own skills and ability to come up with ideas, including outlining, paraphrasing, summarising, and referencing, as well as independently reviewing what one has written. Now, with the advent of AI tools, academic writing has changed significantly. Writers no longer stare at blank pages for long durations. Instead, they turn to artificial intelligence (AI) to brainstorm and suggest ideas for what they might write. Khalifa and Albadawy (2024) conducted a systematic review of 24 studies from PubMed, Embase, and Google Scholar focusing on the use of artificial intelligence in academic writing and research, revealed six core domains indicating AI's usefulness: 1) generating ideas and research design, 2) improving the content and structure, 3) supporting reviewing of literature and synthesising, 4) optimising managing of data and analysis, 5) providing support for editing, reviewing, and publishing, and 6) providing assistance in communication. These identified domains clearly indicate that AI tools are beneficial and essential to facilitate academic writing. A study by Wang (2024) on native and non-native English speakers' generative AI-assisted writing processes showed that students acknowledge that ChatGPT helps them generate initial ideas and inspiration, narrowing their topic and focus. Similarly, Kim et al.'s (2024) study on students' perspectives on generative AI-assisted academic writing revealed that during the ideation stage, AI expedited idea generation and empowered students to proceed with subsequent writing processes. Clearly, with the assistance of AI, current academic practices have been made easier and faster, requiring less effort in beginning the writing process.

Despite the many benefits of AI in academic writing, concerns arise about its impact on students' critical thinking and originality. AI services like ChatGPT can come up with ideas and present arguments as well as create a text with little input. While such capabilities may boost productivity, a reliance on them may detract from engaging in the writing process. Song and Song (2023) noted that ChatGPT increased learners' motivation and writing performance. Nevertheless, students feared dependency on AI-generated feedback. Moreover, the overuse of AI in writing can hinder the development of essential writing skills. The activity of academic writing engages interrelated cognitive and metacognitive processes like planning, drafting, revising and evaluating ideas. Going with AI suggestions too much may lessen opportunities for students to learn or hone these skills by practice. Zhao et al. (2024) suggest that AI represents another milestone in the digitisation of writing rather than a replacement for writers; however, there is a fundamental change to writing practices that should be taken seriously.

The topic of the use of AI in writing is still relevant despite the many studies carried out to highlight the way it is used and the pros and cons. There are several important reasons why it must still be discussed. First, AI is no longer considered an isolated technology but an integral part of writing. It is "the latest stage of ongoing digitisation of writing", which includes spell checkers and grammar checkers, among others, as Zhao et al. (2024) note in their article on ChatGPT and the digitisation of writing. This means that AI-powered tools like ChatGPT or Grammarly are not a threat, a revolution, a massive transformation, or even a replacement for work done by humans, but merely extensions that support writing with digital technologies, a practice that has existed for many years. Next, AI has been increasingly embedded in academic activities at institutions of higher learning. It is inevitable, as higher education requires keeping up with the times and technological development. Most importantly, AI technologies continue to evolve, and as a result, academic writing practices are undergoing a fundamental transformation, making the topic of AI-assisted writing still highly relevant. Therefore, this study

explores the relationships among competence, autonomy, and relatedness in academic writing in the context of ChatGPT usage. Thereby offering insights for the effective integration of ChatGPT into academic writing instruction.

Statement of Problem

The advent of AI tools, especially ChatGPT, has greatly influenced the processes of writing in academic settings. Many students now use AI-powered tools to generate ideas, structure writing assignments, edit drafts, and correct their language skills. It has been proven that ChatGPT could assist in writing assignment effectiveness, increase motivation, promote organisation and coherence, and contribute to generating new ideas when completing academic writing assignments (Song & Song, 2023; Yin & Li, 2024). However, Dergaa et al. (2023) have identified several potential negative implications of overusing AI, including ethical issues and the necessity for learners to evaluate AI output critically.

Although previous studies have examined the benefits and challenges of ChatGPT in academic writing, most of the current body of knowledge has concentrated on the impact of this platform on academic performance, academic achievement, technology adoption, and learning with AI. Few studies have investigated the link between the motivational needs of learners and writing strategies within AI-assisted writing environments. In Self-Determination Theory (SDT), the motivation of learners is driven by three core needs, namely, competence, autonomy, and relatedness (Deci & Ryan, 1985; Ryan & Deci, 2000). Despite the popularity of these constructs in explaining motivation in educational contexts, their connection to writing strategies and ChatGPT has not been sufficiently researched.

Moreover, writing itself is a complicated skill, in which learners must apply several metacognitive, cognitive, effort regulation, social, and affective strategies in order to effectively plan, monitor, evaluate, and modify their writing (Raoofi et al., 2017). Since ChatGPT is rapidly becoming an increasingly popular companion to student writing, it will be important to understand how ChatGPT can help learners become competent and self-directed writers, as well as support learners in their feelings of relatedness to the task through social and affective strategies in writing. This understanding will be necessary, as integrating artificial intelligence into writing education should benefit not only writing proficiency but also learner motivation and engagement.

Thus, acknowledging that AI-powered tools are here to stay and are constantly evolving and essential for academic writing, this study attempts to further investigate the perceptions of learners regarding competence, autonomy, and relatedness of academic writing in using ChatGPT. Moreover, this study explores the relationships between these constructs in order to better understand how AI-assisted writing can help develop not only writing skills but also motivate students. The research can contribute to the field of AI-assisted learning by revealing more insights about the usage of ChatGPT in academic writing.

Objective of the Study and Research Questions

This study is conducted to explore writing, specifically academic writing, and the use of ChatGPT among students. To explore these areas, the study aims to answer the following questions, with related hypotheses:

Is there a significant relationship between (a) competence, (b) autonomy, and (c) relatedness across gender?

$H_{o1:}$ There is no significant relationship between (a) competence, (b) autonomy, and (c) relatedness across gender.

Is there a significant relationship between (a) competence, (b) autonomy, and (c) relatedness across disciplines?

$H_{o2:}$ There is no significant relationship between (a) competence, (b) autonomy, and (c) relatedness across disciplines.

- How do learners perceive their competence in writing?

- How do learners perceive their autonomy in writing?
- How do learners perceive their relatedness in writing?
- Is there a significant relationship between competence and autonomy?

H_{01}: There is no significant relationship between competence and autonomy

- Is there a significant relationship between competence and relatedness

H_{02}: There is no significant relationship between competence and relatedness

- Is there a significant relationship between autonomy and relatedness?

H_{03}: There is no significant relationship between autonomy and relatedness

LITERATURE REVIEW

Theoretical Framework of the Study

Self-Determination Theory (SDT) and Writing

Self-determination theory (SDT), proposed by Deci and Ryan (1985), explains human motivation through the satisfaction of three basic psychological needs: autonomy, competence, and relatedness. According to SDT, individuals are more motivated, engaged, and persistent when they experience a sense of control over their actions, feel capable of meeting challenges, and perceive meaningful connections with others. This emphasis on intrinsic motivation can be fruitfully linked to the cognitive theory of writing developed by Flower and Hayes (1981), which conceptualises writing as a goal-directed, problem-solving activity involving planning, translating, and reviewing. From an SDT perspective, writers who experience autonomy in selecting topics or strategies are more likely to engage deeply in these cognitive processes. Similarly, a sense of competence supports effective planning and revision, as writers monitor and regulate their thinking with confidence. Although Flower and Hayes focus primarily on cognitive mechanisms, SDT provides a complementary motivational lens, suggesting that the quality of writing processes described in the cognitive model is strongly influenced by the writer's motivational orientation (Deci & Ryan, 1985; Flower & Hayes, 1981).

ChatGPT in Writing

ChatGPT can be viewed as a supportive tool in writing development when interpreted through the theory of scaffolding proposed by Wood et al. (1976). Scaffolding refers to temporary, adaptive support that enables learners to perform tasks beyond their current independent ability, which aligns closely with how ChatGPT can assist writers through prompts, feedback, and modelling of language structures. In terms of the cognitive theory of writing by Flower and Hayes (1981), ChatGPT can support key writing processes such as planning, translating ideas into text, and revising drafts by helping writers generate ideas, organise content, and reflect on coherence. This assistance does not replace cognition but instead supplements the writer's problem-solving processes. Furthermore, when used effectively, ChatGPT may also support motivation as explained by self-determination theory (Deci & Ryan, 1985). By offering non-judgmental support and allowing writers to retain control over decisions, ChatGPT can enhance feelings of autonomy and competence. Thus, rather than functioning as a shortcut, ChatGPT can act as a scaffold that supports cognitive engagement and intrinsic motivation in the development of writing skills (Wood et al., 1976; Flower & Hayes, 1981; Deci & Ryan, 1985).

Past Studies on Academic Writing and ChatGPT

ChatGPT and other AI-powered tools have transformed student learning, particularly academic writing in higher education. Several studies have been conducted to investigate academic writing and the use of ChatGPT among students.

Studies have shown that the use of AI, such as with ChatGPT and Grammarly, has led to both positive and negative outcomes. Stanford (2025) investigated the dual impacts of AI tools on master's degree students' academic writing using the Unified Theory of Acceptance and Use of Technology (UTAUT) framework and semi-structured interviews. It was found that AI-powered tools like Grammarly and Google Scholar are especially beneficial for non-native English speakers, helping them improve grammar and fluency, support critical thinking, and encourage originality in writing. Despite these clear benefits, there are concerns about ethical issues such as plagiarism, trust in content generated by AI, and gaps in digital literacy.

Song and Song (2023) conducted an empirical study examining how ChatGPT influences English as a Foreign Language (ELF) students' academic writing performance and motivation. The mixed-methods study used IELTS academic writing tasks as pre- and post-tests to assess writing skills, with fifty EFL students divided into an experimental group (AI-assisted instruction using ChatGPT) and a control group receiving traditional instruction. The study found that the experimental group showed improved writing skills, including organisation, coherence, grammar, and vocabulary, as well as higher motivation for the writing tasks. However, with the use of AI, students also expressed concerns about the need to be careful in how they use its feedback and about the possibility of over-reliance on ChatGPT.

Wang et al. (2024), on the other hand, investigated the impacts of using ChatGPT on the academic writing of 130 third-year Chinese medical college students by collecting systematic reviews in a Communication Skills course and administering questionnaire surveys. Students were divided into two groups: those that use ChatGPT in their writing processes (ChatGPT group) and those who wrote about ChatGPT assistance (wrote manually - the control group). The study found that more than the majority of the students in the ChatGPT group had their writing time significantly reduced compared to the non-ChatGPT group. They also displayed improved writing quality, and enhanced writing satisfaction - all pointing to better efficacy with assistance from ChatGPT.

Dergaa et al (2023), in a conceptual review of the benefits and risks of using ChatGPT and other Large Learning Models (LLMs) in academic and research writing, using a quasi-qualitative approach reviewing existing literature, found that NLP technologies and ChatGPT can save researchers a significant amount of time, as these AI-powered tools can automate tasks that would normally be done manually, such as extracting information from academic papers and summarising them besides providing inspirations on what to write. Dergaa et al. also emphasised the importance of exercising caution when using ChatGPT, ensuring its use aligns with other research methods, acknowledging its limitations, and staying informed about emerging NLP developments. Additionally, it is important for educators and academic bodies to establish clear guidelines and policies to ensure transparent and ethical use of ChatGPT and other AI-powered tools.

All in all, these past studies and reviews of the use of artificial intelligence like ChatGPT in academic writing suggest that, despite the efficiency gains and increasing popularity of work accelerated by AI, there are still concerns and challenges to overcome to preserve integrity and ensure quality work.

Conceptual Framework of the Study

Writing is a complex task. Learners at any level face challenges in completing their writing assignments. The processes are facilitated by the use of writing strategies (Khairuddin et.al., 2021), and the strategies facilitate the writer to complete the writing task. Some strategies help learners with the cognitive aspects, while some strategies help learners with their metacognition (Rahmat, 2020). Additionally, Raoofi et al. (2017) state that writing strategies include metacognitive, effort regulation, cognitive, social, and affective writing strategies.

Figure 1 presents the conceptual framework of the study. The concept of this study is anchored by the Self-Determination Theory (Ryan & Deci, 2000). The main components of this anchor theory are autonomy, relatedness, and competence.

This study merges the concepts from the theory and corresponds the concepts to the studies by Raoofi et al. (2017) and Youssef et al. (2024). This idea for this study is based on the fact that in order to increase their

competence, writers use ChatGPT to assist them. According to Youssef et al. (2024), the use of ChatGPT can influence a person's critical thinking abilities, academic achievement, ChatGPT usage, and student engagement.

Figure 1 shows the factor of Competence by Ryan and Deci (2000) which corresponds with the use of ChatGPT. Next, writers gain Autonomy when they use writing strategies such as Metacognitive, Effort Regulation and Cognitive strategies. Lastly, the use of strategies like social and affective corresponds to the concept of Relatedness. This study also explores if there is a relationship between all components in the study.

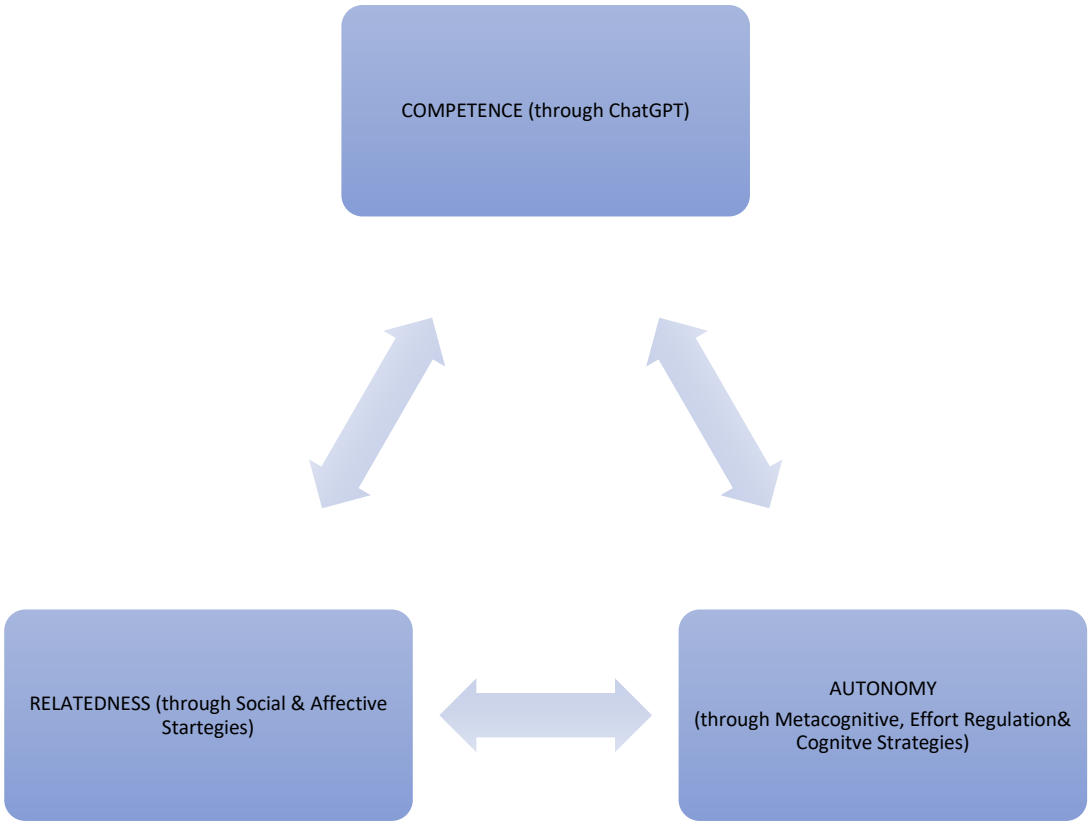

Figure 1: Conceptual Framework of the Study: Writing and ChatGPT using SDT

METHODOLOGY

This quantitative study is done to explore writing, specifically academic writing, and the use of ChatGPT. A convenient sample of 126 participants from various degree programmes at Universiti Teknologi MARA (UiTM) responded to the survey. These participating undergraduates are from various faculties, representing either the Science and Technology or the Social Sciences and Humanities cluster.

The instrument used is a 5-point Likert-scale survey and is rooted in Raoofi et al. (2017) and Youssef et al. (2024) to assess the variables as displayed in Table 3. Table 1, on the other hand, shows the Likert scale categories: 1 (Strongly Disagree), 2 (Disagree), 3 (Undecided), 4 (Agree), and 5 (Strongly Agree).

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	
B	AUTONOMY	Metacognitive	10	20 (.925)
		Effort Regulation	4	
		Cognitive	6	
C	RELATEDNESS	Social	4	7 (.812)
		Affective	3	
D	COMPETENCE	Critical thinking abilities	4	16 (.919)
		Academic achievement	4	
		ChatGPT usage	5	
		Student engagement	3	
				43 (.937)

Table 2 shows the distribution of items in the survey. Section B has 20 items on Autonomy. Section C has 7 items on Relatedness, and Section D has 16 items on competence.

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, a reliability analysis is conducted. Table 3 above shows the distribution and interpretation of the Cronbach's alpha range. According to Ahmad et al. (2024), Cronbach's alpha scores between 0.7 and 0.9 are considered acceptable to excellent.

Table 2 also shows the reliability of the survey. The analysis shows a Cronbach's alpha of .925 for Autonomy, .812 for Relatedness, and .919 for Competence. The overall Cronbach's alpha for all 43 items is .937, indicating good reliability of the instrument 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), researchers report demographic data in percentages to establish sample representativeness and allow for generalisability 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	27%
		Female	73%
2	Cluster	Science & Technology	44%
		Social Sciences & Humanities	56%

Table 4 presents the demographic profile of the respondents. Most respondents were female (73% of the sample), while male respondents accounted for 27%, indicating that female participants were more strongly represented in this study. Regarding academic discipline, 56% of the respondents were from the Social Sciences and the Humanities cluster, whereas 44% were in the Science and Technology cluster. While respondents from both clusters were involved in the study, the Social Sciences and Humanities cluster accounted for a slightly larger percentage than the Science and Technology cluster.

Inferential Statistics

According to Shah (2023), there are three main functions of a t-test. Firstly, t-tests are done to compare means. This test is also done to determine if the average scores (mean) or values of two groups, or one group against a known value, are different enough to be considered statistically meaningful and are not just due to random chance. Secondly, a t-test is done to test hypotheses. Researchers use t-tests to test hypotheses about means, such as whether a new treatment significantly impacts a variable or if there's a difference in performance between two distinct groups. Lastly, the t-test is used to identify significant differences. The output of a t-test provides a p-value (significance value). If this p-value is below a predetermined threshold (often 0.05), it indicates a statistically significant difference, allowing researchers to draw conclusions about the populations from which their samples were drawn.

Findings for Gender

This section presents data to answer research question 1: Is there a significant relationship between (a) competence, (b) autonomy, and (c) relatedness across gender?

$H_{o1:}$ There is no significant relationship between (a) competence, (b) autonomy, and (c) relatedness across gender

Table 5: T-test for (a) competence, (b) autonomy, and (c) relatedness across gender

Group Statistics

	Q1GENDER	N	Mean	Std. Deviation	Std. Error Mean
COMPETENCE	MALE	34	4.0313	.50758	.08705
	FEMALE	92	3.7432	.61764	.06439
AUTONOMY	MALE	34	3.9353	.55248	.09475
	FEMALE	92	3.9212	.51453	.05364
RELATEDNESS	MALE	34	3.8235	.64471	.11057
	FEMALE	92	3.6584	.63991	.06672

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p			Lower	Upper
COMPETENCE	Equal variances assumed	1.654	.201	2.431	124	.008	.016	.28804	.11849	.05353	.52256
	Equal variances not assumed			2.660	71.260	.005	.010	.28804	.10828	.07216	.50393
AUTONOMY	Equal variances assumed	.355	.553	.134	124	.447	.894	.01410	.10535	-.19441	.22261
	Equal variances not assumed			.129	55.479	.449	.897	.01410	.10888	-.20406	.23226
RELATEDNESS	Equal variances assumed	.007	.931	1.283	124	.101	.202	.16514	.12869	-.08957	.41986
	Equal variances not assumed			1.279	58.587	.103	.206	.16514	.12914	-.09329	.42358

An independent sample t-test was performed in order to find out whether there were any gender differences in competence, autonomy, and relatedness. As it turned out, there was a statistically significant difference in competence between males and females, t(124) = 2.431, p = .016, since males had a significantly higher mean score in comparison to females (M = 4.03, SD = 0.51 vs. M = 3.74, SD = 0.62). Nevertheless, no significant gender differences were found in terms of autonomy, t(124) = 0.134, p = .894, and relatedness, t(124) = 1.283, p = .202. In other words, although males felt that they had higher competence in academic writing when using ChatGPT, both genders showed equal autonomy and relatedness.

Findings for Discipline

This section presents data to answer research question 2: Is there a significant relationship between (a) competence, (b) autonomy, and (c) relatedness across disciplines?

$H_{o2:}$ There is no significant relationship between (a) competence, (b) autonomy, and (c) relatedness across disciplines

Table 6: T-Test for (a) competence, (b) autonomy, and (c) relatedness across disciplines

Group Statistics

	Q2DIS	N	Mean	Std. Deviation	Std. Error Mean
COMPETENCE	S&T	56	3.9911	.59680	.07975
	SS,H & B	70	3.6848	.57444	.06866
AUTONOMY	S&T	56	3.8804	.52507	.07017
	SS,H & B	70	3.9607	.52204	.06240
RELATEDNESS	S&T	56	3.7092	.69398	.09274
	SS,H & B	70	3.6980	.60391	.07218

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance		Mean	Std. Error	95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Difference	Difference	Lower	Upper
COMPETENCE	Equal variances assumed	.649	.422	2.923	124	.002	.004	.30625	.10479	.09885	.51365
	Equal variances not assumed			2.910	115.965	.002	.004	.30625	.10523	.09782	.51468
AUTONOMY	Equal variances assumed	.468	.495	-.856	124	.197	.393	-.08036	.09384	-.26608	.10537
	Equal variances not assumed			-.856	117.708	.197	.394	-.08036	.09390	-.26630	.10559
RELATEDNESS	Equal variances assumed	2.106	.149	.097	124	.461	.923	.01122	.11571	-.21780	.24025
	Equal variances not assumed			.096	109.726	.462	.924	.01122	.11752	-.22167	.24412

A two-sample t-test was performed to compare knowledge of short stories between those who have experience and those who do not have experience in writing short stories. There was a significant difference in knowledge of short stories between those who have experience writing short stories (M=2.86, SD= 1.47) and those who do not have experience writing short stories (M=1.81, SD=.028); t(62)=3.33,p=.001.

Descriptive Statistics

To facilitate the interpretation of the findings, the mean and standard deviation were calculated. 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, reflecting the data's variability or spread. A low SD means the data points are clustered close to the mean, while a high. SD indicates they are more spread out. It is good to have a high SD.

Findings for Competence

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

Table 7: 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.	3.89	0.89
CTQ2 ChatGPT's responses made me doubt their validity, leading me to seek further clarification or evidence.	3.89	0.88
CTQ3 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.	3.98	0.82
CTQ4 I need clarification about the accuracy of ChatGPT's output, which often encourages me to evaluate the information and conduct additional research independently.	4.00	0.85

In terms of critical thinking abilities, respondents agreed most with the need for clarification about the accuracy of the feedback ChatGPT provides (M = 4.00). With a standard deviation of 0.85, this response reflects strong internal consistency and good reliability. The next response indicating a close indication of agreement is the idea of actively exploring alternative viewpoints or sources of information when using ChatGPT, as it helps achieve a better understanding of the topic (M = 3.98, SD = 0.82). On the other hand, the items pertaining to the need for clarification on the precision and reliability of information provided by ChatGPT, which enhances critical thinking skills, and the item on ChatGPT's responses that make respondents doubt their validity, leading them to seek further clarification or evidence, both received a mean of 3.89, but with slightly different standard deviations of 0.89 and 0.88. Both responses indicate strong internal consistency.

Table 8: 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.	3.98	0.76
AAQ2 ChatGPT brings innovative ideas that are ready to be shared with students.	3.83	0.75
AAQ3 Students can anticipate robust writing guidance from ChatGPT.	3.60	0.87
AAQ4 ChatGPT has improved my academic performance.	4.00	0.84

Next, regarding academic achievement and competence, respondents agreed that ChatGPT has improved their academic performance (M = 4.00, SD = 0.84). This is followed by a mean of 3.98, indicating active exploration of alternative viewpoints or sources of information when using ChatGPT. With a standard deviation of 0.76, this response still indicates acceptable internal consistency. Next, with a mean of 3.83, respondents believed that ChatGPT brings innovative ideas ready to share with students (SD = 0.75). Finally, with a mean of 3.60 and a standard deviation of 0.83, respondents indicated that students could expect robust writing guidance from ChatGPT.

Table 9: 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 favourably used today.	3.80	0.93
CUQ2 Students seek help from ChatGPT's assistance in composing essays and articles.	3.90	0.83
CUQ3 ChatGPT helps students in English language translation.	3.90	0.95
CUQ4 Employing ChatGPT significantly improves human productivity.	3.56	1.01

CUQ5 The advent of ChatGPT marks a groundbreaking transformation in Natural Language Processing capabilities.	2.65	0.94

Moreover, regarding ChatGPT usage, respondents agreed most with the statements that students seek ChatGPT's assistance in composing essays and articles (SD = 0.83) and that ChatGPT helps students with English-language translation (SD = 0.95), both with a mean of 3.90. On the other hand, with a mean of 3.80 (SD = 0.93), respondents believed that ChatGPT is a state-of-the-art writing model that is favourably used today. In addition, respondents fairly believed that employing ChatGPT significantly improves human productivity (M = 3.56, SD = 1.01). Lastly, with a mean of 2.65 and a standard deviation of 0.94, respondents expressed their thoughts that the advent of ChatGPT marks a groundbreaking transformation in Natural Language Processing capabilities.

Table 10: 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.	3.62	0.95
SEQ2 ChatGPT increases confidence in my ability to conduct research/to search for materials	3.60	0.99
SEQ3 ChatGPT is easy to use and more engaging for me	3.93	0.97

Table 10 shows the mean (M) and standard deviation (SD) of the level of student engagement when using ChatGPT. In general, the results show that there was an engagement in positive engagement levels. Respondents scored highest on the statement, "ChatGPT is easy to use and more engaging for me," which had a mean and standard deviation of M= 3.93 and SD=0.97 respectively. It indicates that the respondents find ChatGPT to be engaging and easy to use in their learning process. This is followed by the statement, "ChatGPT is more interactive, human-like, and engaging for the students." This had a mean of M=3.62 and standard deviation of SD=0.95, indicating that the respondents find ChatGPT to be interactive in their learning process. Lowest scores were recorded on "ChatGPT increases confidence in my ability to conduct research/to search for materials," which had a mean and standard deviation of M=3.60 and SD=0.99 respectively.

Findings for Autonomy

This section presents data to answer research question 4: How do learners perceive their autonomy in writing? In the context of this study, this is measured by (i) metacognition, (ii) effort regulation, and (iii) cognitive strategies.

Table 11: Mean (M) and Standard Deviation (SD) for Metacognitive (Mws)

ITEM	M	SD
MWSQ 1 I organize my ideas prior to writing.	3.89	0.78
MWSQ 2 I revise my writing to make sure that it includes everything I want to discuss in my writing.	4.17	0.71
MWSQ 3 I check my spelling.	4.10	0.89
MWSQ 4 I check my writing to make sure it is grammatically correct.	4.10	0.84
MWSQ 5 I evaluate and re-evaluate the ideas in my essay.	3.96	0.73
MWSQ 6 I monitor and evaluate my progress in writing.	3.79	0.92
MWSQ 7 I revise and edit an essay two or more times before I hand it in to my teacher.	3.93	0.89
MWSQ8 I go through the planning stages in my writing.	3.83	0.89
MWSQ9 I go through the drafting stages in my writing.	3.95	0.88
MWSQ10 I go through the revising and editing stages in my writing.	4.06	0.77

Table 11 presents the mean (M) and standard deviation (SD) for respondents' use of metacognitive writing strategies. Overall, the findings indicate that respondents frequently employ metacognitive strategies when completing writing tasks. The highest mean score was recorded for the item *"I revise my writing to make sure that it includes everything I want to discuss in my writing"* (M = 4.17, SD = 0.71), suggesting that respondents place considerable importance on reviewing their work to ensure content completeness. This was followed by checking spelling and checking grammatical accuracy, both recording a mean of 4.10, indicating that respondents are highly attentive to language accuracy in their writing. Respondents also reported frequently engaging in revising and editing activities (M = 4.06, SD = 0.77), evaluating and re-evaluating ideas (M = 3.96, SD = 0.73), and going through drafting stages (M = 3.95, SD = 0.88). The lowest mean score was observed for monitoring and evaluating progress in writing (M = 3.79, SD = 0.92), although the score still reflects a relatively high level of agreement. Overall, the findings suggest that respondents actively monitor, evaluate, and revise their writing, and this demonstrates a strong use of metacognitive strategies in the writing process.

Table 12: Mean (M) and Standard Deviation (SD) for Effort Regulation (Ers)

ITEM	M	SD
ERSQ 1 I write a lot to develop my writing skills.	3.39	0.92
ERSQ 2 I often work hard to do well in my writing even if I don't like English writing tasks.	3.73	0.84
ERSQ 3 Even if the writing activities are difficult, I don't give up but try to engage in them.	3.89	0..79
ERSQ 4 I concentrate as hard as I can when doing a writing task.	4.02	0.80

Table 12 shows the mean (M) and standard deviation (SD) of respondents' effort regulating strategies in writing. Results show that respondents tended to exhibit a positive level of persistence and commitment when completing writing assignments. The highest mean score (M = 4.02, SD = 0.80) was achieved on the item "I concentrate as hard as I can when doing a writing task." This suggests that respondents can maintain concentration and focus their attention on writing tasks. This was followed by "Even if the writing activities are difficult, I don't give up but try to engage in them" (M = 3.89, SD = 0.79), indicating a strong willingness to persevere despite challenges. Respondents also agreed that they often work hard to do well in writing tasks even when they do not especially enjoy them (M = 3.73, SD = 0.84). The lowest mean score was recorded for the item 'I write a lot to develop my writing skills' (M = 3.39, SD = 0.92), implying that although respondents recognise the value of practice, they may not consistently engage in extensive writing to improve their skills. The findings suggest that respondents have a relatively high level of effort regulation in completing writing tasks successfully.

Table 13: Mean (M) and Standard Deviation (SD) for Cognitive (Cws)

ITEM	M	SD
CWSQ1 I use memorised grammatical elements such as singular and plural forms, verb tenses, prefixes and suffixes, etc, in my writing	3.96	0.79
CWSQ 2 I put newly memorised vocabulary in my sentences.	3.84	0.85
CWSQ 3 In order to generate ideas for my writing, I usually engage myself in brainstorming.	3.94	0.77
CWSQ 4 I use different words that have the same meaning.	3.83	0.86
CWSQ 5 I use my experiences and knowledge in my writing.	4.10	0.70
CWSQ 6 I try to use effective linking words to ensure clear and logical relationship between sentences or paragraphs	4.02	0.74

From the perspective of cognitive strategies in using ChatGPT, respondents agreed that they draw on their experiences and knowledge in their writing (M = 4.10, SD = 0.70). Respondents also agreed that they try to use effective linking words to ensure a clear and logical relationship between sentences or paragraphs (M = 4.02, SD = 0.74). Closely following is the belief that they use memorised grammatical elements, such as singular and

plural forms, verb tenses, prefixes and suffixes, and others, in their writing (M = 3.96, SD = 0.79). The thought that they usually engage in brainstorming to generate ideas for their writing is next, with a mean of 3.94 (SD = 0.77). Lastly, a significant mean of 3.84 (SD = 0.85) and a mean of 3.83 (SD = 0.86) indicate that the respondents put newly memorised vocabulary into their sentences and use different words with the same meaning, respectively.

Findings for Relatedness

This section presents data to answer research question 5: How do learners perceive their relatedness in writing? In the context of this study, this is measured by (i) social and (ii) affective strategy.

Table 14: 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.	3.66	1.00
SWSQ 2After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it.	3.52	1.08
SWSQ 3 I try to identify friends or classmates whom I can ask for help in my writing.	3.73	0.96
SWSQ 4 When I have trouble writing my essay, I try to do it with my classmates or friends.	3.51	1.07

From a social strategy perspective, respondents posited that they try to identify friends or classmates they can ask for help with their writing (M = 3.73, SD = 0.96). Next, respondents suggested that to generate ideas for their writing, they usually discuss the writing topic with a friend or classmate (M = 3.66, SD = 1.00). Respondents also believed that after thoroughly revising and editing their essay, they ask a friend or classmate to read and comment on it (M = 3.53, SD = 1.08), and when they have trouble writing their essay, they try to do it with their classmates or friends (M = 3.51, SD = 1.07).

Table 15: Mean (M) and Standard Deviation (SD) for AFFECTIVE (AWS)

ITEM	M	SD
AWSQ1 I try to write an essay in class with confidence and ease.	3.70	1.07
AWSQ2 I try to relax whenever I feel afraid of writing.	3.81	0.81
AWSQ3 I encourage myself to write even when I am afraid of making mistakes.	4.00	0.79

The use of affective strategies by the respondents while writing is presented in Table 15. The findings suggest that respondents are able to motivate themselves when writing. The highest mean is achieved in the item "I encourage myself to write even though I may fear making mistakes" with M = 4.00 and SD = 0.79. It shows that respondents are usually motivated to continue writing despite their fear of making mistakes. Furthermore, the respondents reported being able to control their nervousness when writing (M = 3.81; SD = 0.81). Finally, the respondents feel confident when they write essays in class (M = 3.70; SD = 1.07). Thus, the respondents employ positive coping strategies to overcome writing-related anxiety, build confidence, and stay motivated throughout the writing process.

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 is a common tool for describing simple relationships without making a statement about cause and effect. This section presents data to answer the research question on correlation.

Additionally, according to He (2024), the coefficient is significant at the .05 level, and the correlation is positive, measured on a scale from 0.1 to 1.0. 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. To determine whether there is a significant association in the mean scores across all components of the writing data, SPSS is used to compute correlations. Results are presented separately in Table 16 below.

Table 16: Correlation between all components in writing

Correlations				
		COMPETENCE	AUTONOMY	RELATEDNESS
COMPETENCE	Pearson Correlation	1	.396**	.341**
	Sig. (2-tailed)		<.001	<.001
	N	126	126	126
AUTONOMY	Pearson Correlation	.396**	1	.526**
	Sig. (2-tailed)	<.001		<.001
	N	126	126	126
RELATEDNESS	Pearson Correlation	.341**	.526**	1
	Sig. (2-tailed)	<.001	<.001	
	N	126	126	126
**. Correlation is significant at the 0.01 level (2-tailed).				

Findings for the Relationship between competence and autonomy

This section presents data to answer research question 6: Is there a significant relationship between competence and autonomy?

H_{03}: There is no significant relationship between competence and autonomy

With reference to Table 16, there is a moderate, positive, significant relationship between competence and autonomy (r=.396**) and (p=<.000). The null hypothesis is rejected for H_{03}.

Findings for the Relationship between competence and relatedness

This section presents data to answer research question 7: Is there a significant relationship between competence and relatedness

H_{04}: There is no significant relationship between competence and relatedness

With reference to Table 16, there is a moderate, positive, significant

relationship between competence and relatedness (r=.341**) and (p=<.000).

The null hypothesis is rejected for H_{04}.

Findings for the Relationship between autonomy and relatedness

This section presents data to answer research question 6: Is there a significant relationship between autonomy and relatedness?

H_{05}: There is no significant relationship between autonomy and relatedness

With reference to Table 16, there is a strong, positive, significant relationship between autonomy and relatedness (r=.526**) and (p=<.000). The null hypothesis is rejected for H_{05}.

CONCLUSION

Summary of Findings and Discussions

The present study aimed at examining the connection between competence, autonomy, and relatedness concerning academic writing with ChatGPT as the tool. In answering the first research question, the results of this study indicated the existence of a considerable gender difference in terms of competence, in that male participants showed greater competence compared to female participants. However, no such gender differences existed in the case of autonomy and relatedness. This means that even though men and women may vary regarding competence when using ChatGPT in academic writing, they have equal amounts of self-regulation and social connection. No gender comparison was made among the reviewed studies; hence, this study provides valuable information in this regard.

To respond to the second research question, it can be concluded that respondents had positive perceptions about competence in terms of writing using ChatGPT. When considering the different competence components, respondents agreed the most on their perceptions of academic achievement and critical thinking skills, while there were lower perceptions in certain components of ChatGPT utilisation. All in all, it seems that learners perceive ChatGPT as a technology which can be used for effective learning, improving academic success, and critically evaluating information. This result corresponds to the results of studies carried out by Song and Song (2023), who claimed that AI-aided instructions positively influenced students' writing performance and motivation. In line with this finding is the study by Wang et al. (2024), which reported increased writing quality and satisfaction from writing among students using ChatGPT. The result can also be supported by the work of Kim et al. (2024), which found that generative AI increased idea generation and simplified the writing process. On the other hand, the current study revealed that learners critically evaluated ChatGPT-generated information, which was one of the problems highlighted by Dergaa et al. (2023).

Thirdly, the research question focused on the perceptions of learner autonomy in writing. According to the results obtained, the participants often applied metacognitive, effort-regulation, and cognitive strategies. The use of metacognitive strategies was highest among the three types, indicating that the respondents continuously revised, monitored, and assessed their writing. At the same time, effort-regulation strategies were found to be used comparatively infrequently by the participants, suggesting that they rarely practised their writing. These findings corroborate those offered by Raoofi et al. (2017). Namely, these scholars stated that writing requires applying several types of writing strategies, such as metacognitive, cognitive, and effort-regulation strategies. Thus, based on the findings, one may argue that the learners continued being active in the writing process, even using AI as a tool, which supports the arguments of Zhao et al. (2024).

The last three research questions explored the relationships among competence, autonomy, and relatedness. The results of the correlation analysis showed significant positive relationships among all three variables. While there were moderate positive relationships between competence and autonomy as well as competence and relatedness, a strong positive relationship was found between autonomy and relatedness. These results confirm the predictions of Self-Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000), according to which competence, autonomy, and relatedness are psychological needs dependent on each other and contributing to motivation and engagement. In addition, the results lend support to the scaffolding framework for ChatGPT used in the study. Indeed, in line with the scaffolding framework presented by Wood et al. (1976), ChatGPT seems to offer temporary scaffolding that helps learners improve their competence while supporting self-regulation and promoting emotional and social engagement.

It is clear that this paper corroborates the view that the use of AI writing is beneficial for students, provided it is used properly. In general, this paper supports earlier research on ChatGPT and academic writing but at the same time goes further because it examines how competence, autonomy, and relatedness relate to each other in terms of Self-Determination Theory.

Implications and Suggestions for Future Research

Theoretical and Conceptual Implications

The current study contributes to the growing literature on AI-based writing by applying Self-Determination Theory (SDT) to the context of ChatGPT-powered academic writing. The results indicate that competence, autonomy, and relatedness are positively related to one another, thus confirming Deci and Ryan (1985) that the satisfaction of such psychological needs leads to higher learner motivation and involvement. The identified strong connections among the studied constructs imply that learners who perceive themselves as competent in writing are also more likely to experience greater autonomy and stronger social connectedness during the writing process.

The results also contribute to conceptualising ChatGPT as a learning scaffold. In line with the scaffolding theory developed by Wood et al. (1976), ChatGPT is also able to offer learners assistance in idea generation, information evaluation, and writing development, and at the same time retain learner control in the writing process. In addition, the high level of self-regulatory strategies employed reflects the fact that learners remain actively involved in the planning, monitoring, revising, and evaluation of their writing. All this supports the study's conceptualisation that ChatGPT can foster competence while promoting autonomy in learners.

Pedagogical Implications

From the results above, it is clear that ChatGPT should be treated as a supplementary learning tool, and not as a substitute for the writing skills of the learners. It would be possible to include ChatGPT within writing classes to help with idea formation, brainstorming, writing, and revising while ensuring students assess the accuracy of information provided by AI systems. In view of the frequency of metacognitive and cognitive strategy usage among the respondents, it would be possible to devise writing tasks aimed at planning, self-regulation, and revising.

Additionally, the results emphasise the necessity of enhancing the AI literacy of students. Students must be informed about how to work with ChatGPT responsibly and ethically and not rely too heavily on the AI. Writing classes might have assignments where students would need to compare responses from the AI to the academic literature, analyse their credibility, and explain their choices in writing.

Suggestions for Future Research

Further investigations can be done on the influence of ChatGPT usage on the writing competency, motivational levels, and self-regulatory skills of learners. Although the current investigation is limited to the learners' perceptions, this study acknowledges the limitations associated with the use of self-reported data and the cross-sectional research design. As the findings represent a single point in time, they do not permit causal conclusions or an assessment of changes in writing performance over time. Therefore, future research could examine whether ChatGPT usage improves students' writing abilities over time.

Researchers may also adopt a mixed-method or qualitative approach to have a deeper insight into how the learners interact with ChatGPT. Interviews or group discussion sessions can help identify how learners make decisions while using AI-based suggestions and how it affects their writing process. Further research could also adopt a longitudinal or experimental designs to examine whether Chat GPT produces measurable improvements in writing performance.

REFERENCES

1. Ahmad, N., Alias, F. A., Hamat, M., & Mohamed, S. A. (2024). Reliability analysis: Application of Cronbach's alpha in research instruments. SIG: e-Learning@CS, 114–119. https://appspenang.uitm.edu.my/sigcs/
2. Bhat, A. K. (2025). The evolution of AI: From foundations to future prospects. https://www.computer.org/publications/tech-news/research/evolution-of-ai

3. Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Springer Science & Business Media. https://doi.org/10.1007/978-1-4899-2271-7
4. Dergaa, I., Chamari, K., Zmijewski, P., & Ben Saad, H. (2023). From human writing to artificial intelligence-generated text: Examining the prospects and potential threats of ChatGPT in academic writing. Biology of Sport, 40(2), 615–622. https://doi.org/10.5114/biolsport.2023.125623
5. Flower, L., & Hayes, J. R. (1981). A cognitive process theory of writing. College Composition and Communication, 32(4), 365–387.
6. He, L. (2024). The application of SPSS correlation analysis in the study of precision teaching of English in universities. Applied Mathematics and Nonlinear Sciences, 9(1), 1–13. https://doi.org/10.2478/amns-2024-1371
7. Khairuddin, Z., Rahmat, N. H., Noor, M. M., & Khairuddin, Z. (2021). The use of rhetorical strategies in argumentative essays. Pertanika Journal of Social Sciences and Humanities, 29(S3), 263–285. https://doi.org/10.47836/pjssh.29.S3.14
8. Kim, J., Yu, S., Detrick, R., & Li, N. (2024). Exploring students' perspectives on generative AI-assisted academic writing. Education and Information Technologies, 30, 1265–1300. https://doi.org/10.1007/s10639-024-12878-7
9. Khalifa, M., & Albadawy, M. (2024). Using artificial intelligence in academic writing and research: An essential productivity tool. Computer Methods and Programs in Biomedicine Update, 5, Article 100145. https://doi.org/10.1016/j.cmpbup.2024.100145
10. Rahmat, N. H. (2021). An investigative study of cognitive and metacognitive paraphrasing strategies in ESL writing. International Journal of Academic Research in Business and Social Sciences, 11(3), 76–87. https://doi.org/10.6007/IJARBSS/v11-i3/8919
11. Raoofi, S. M., Miri, A., Gharibi, J., & Malaki, B. (2017). Assessing and validating a writing strategy scale for undergraduate students. Journal of Language Teaching and Research, 8(3), 624–633. http://www.academypublication.com/issues2/jltr/vol08/03/23.pdf
12. Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68
13. Song, C., & Song, Y. (2023). Enhancing academic writing skills and motivation: Assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. Frontiers in Psychology, 14, Article 1260843. https://doi.org/10.3389/fpsyg.2023.1260843
14. Stanford, J. (2025). How disruptive is AI in students' academic writing in higher education? Studies in Technology Enhanced Learning, 4(1). https://doi.org/10.21428/8c225f6e.b1d05ed3
15. Vetter, T. R. (2017). Descriptive statistics: Reporting the answers to the 5 basic questions of who, what, why, when, where, and a sixth, so what? Anesthesia & Analgesia, 125(5), 1797–1802. https://doi.org/10.1213/ANE.0000000000002471
16. Wang, C. (2024). Exploring students' generative AI-assisted writing processes: Perceptions and experiences from native and nonnative English speakers. TechTrends, 30, 1825–1846. https://doi.org/10.1007/s10758-024-09744-3
17. Wang, J., Liao, Y., Liu, S., Zhang, D., Wang, N., Shu, J., & Wang, R. (2024). The impact of using ChatGPT on academic writing among medical undergraduates. Annals of Medicine, 56(1). https://doi.org/10.1080/07853890.2024.2426760
18. Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. Journal of Child Psychology and Psychiatry, 17(2), 89–100.
19. Yin, Y., & Li, C. (2024). Application and innovation of artificial intelligence in economics and management courses in universities. Journal of Service Science and Management, 17, 345–353. https://doi.org/10.4236/jssm.2024.174017
20. Youssef, E., Medhat, M., Abdellatif, S., & Al Malek, M. (2024). Examining the effect of ChatGPT usage on students' academic learning and achievement: A survey-based study in Ajman, UAE. Computers and Education: Artificial Intelligence, 7, Article 100316. https://doi.org/10.1016/j.caeai.2024.100316
21. Ziegenfuss, J. Y., Casey, A. E., Jennifer, M. D., Meghan, M. J., Thomas, E. K., & Marna, C. (2021). Impact of demographic survey questions on response rate and measurement: A randomized experiment. Survey Practice, 14(1). https://doi.org/10.29115/SP-2021-0010

22. Zhao, X., Cox, A., & Cai, L. (2024). ChatGPT and the digitisation of writing. Humanities and Social Sciences Communications, 11, Article 482. https://doi.org/10.1057/s41599-024-02904-x

APPENDIX

WRITING STRATEGIES & CHAT GPT

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

SECTION	VARIABLE	CONSTRUCT	NO OF ITEMS
B	AUTONOMY	Metacognitive	10
		Effort Regulation	4
		Cognitive	6
C	RELATEDNESS	Social	4
		Affective	3
D	COMPETENCE	Critical thinking abilities	4
		Academic achievement	4
		ChatGPT usage	5
		Student engagement	3

SECTION B-Autonomy

METACOGNITIVE (MWS)

ITEM	1	2	3	4	5
MWSQ 1 I organise 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 1 I write a lot to develop my writing skills.					
ERSQ 2 I often work hard to do well in my writing even if I don't like English writing tasks.					
ERSQ 3 Even if the writing activities are difficult, I don't give up but try to engage in them.					
ERSQ 4 I 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 memorised grammatical elements such as singular and plural forms, verb tenses, prefixes and suffixes, etc., in my writing					
CWSQ 2 I put newly memorised vocabulary in my sentences.					
CWSQ 3 In order to generate ideas for my writing, I usually engage myself in brainstorming.					
CWSQ 4 I use different words that have the same meaning.					
CWSQ 5 I use my experiences and knowledge in my writing.					
CWSQ 6 I try to use effective linking words to ensure clear and logical relationship between sentences or paragraphs.					

SECTION B-RELATEDNESS

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 2 After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it.					
SWSQ 3 I 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
AWSQ1 I try to write an essay in class with confidence and ease.					
AWSQ2 I try to relax whenever I feel afraid of writing.					
AWSQ3 I encourage myself to write even when I am afraid of making mistakes					

SECTION C-COMPETENCE

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.					
CTQ4 I 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 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.					

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