

The Influence of ChatGPT on Discourse & Content Knowledge

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DOI: <https://doi.org/10.47772/IJRISS.2026.102100045>

Received: 09 July 2026; Accepted: 14 July 2026; Published: 24 July 2026

ABSTRACT

ChatGPT is an artificial intelligence language model that generates human-like text based on user input. It is trained on large datasets and produces clear and relevant responses, making it a useful tool for studying discourse and content knowledge. Its growing use in academic and communication settings influences how users construct meaning, understand information, and produce written texts. This study examines the influence of ChatGPT on discourse knowledge and content knowledge in writing within educational contexts. A quantitative approach was employed using a 5-point Likert-scale survey comprising four sections: demographic profile (2 items), discourse knowledge (10 items), content knowledge (17 items), and ChatGPT use (16 items). A total of 165 students from two Malaysian public universities, enrolled in German as a third language or as an elective, participated in the study. The findings show that ChatGPT improves students' engagement, critical thinking, and writing performance. However, it has no significant effect on content knowledge and discourse knowledge, as these depend more on learners' cognitive processes and prior knowledge. The results also show that gender does not significantly influence the use of ChatGPT or its relationship with writing knowledge. Overall, ChatGPT supports the writing process, but deeper writing development depends mainly on learner-related factors. Therefore, ChatGPT should be used as a supportive tool in teaching rather than as a replacement for cognitive and pedagogical development.

Keywords: ChatGPT, Language Learning, Writing Performance, Content Knowledge, Discourse Knowledge

INTRODUCTION

Background of Study

The rapid growth of ChatGPT has significantly influenced higher education by transforming how students access information, communicate ideas, and complete academic tasks. Unlike traditional technologies that function mainly as search engines or calculation tools, ChatGPT acts as an interactive conversational tool that can assist students in generating ideas, organizing content, and improving written work (Baidoo-Anu & Ansah, 2023). As its use becomes increasingly common in academic settings, it is important to examine its impact on two key aspects of learning: academic discourse and content knowledge.

One area that ChatGPT may influence is academic discourse. Academic discourse refers to the specialized language, communication practices, and conventions used to construct and convey knowledge in academic

contexts (Hyland, 2009). Through features such as grammar correction, text generation, paraphrasing, and structural guidance, ChatGPT has the potential to enhance students' academic writing and communication skills (Khampusaen, 2024). As a result, students may become more effective in presenting arguments, organizing ideas, and producing academically acceptable written work. Another important area is content knowledge, which refers to an individual's understanding of subject-specific concepts, facts, theories, and principles (Shulman, 1986).

Despite the growing number of studies on ChatGPT, this topic remains highly relevant because most early research focused broadly on STEM fields or treated all students the same. However, AI does not affect every field of study in the same way (Adhikari et al., 2025). This paper addresses that research gap by studying a unique student group that is 67% female and heavily concentrated in the Social Sciences and Humanities (57%).

Focusing on this specific group is important. The humanities and social sciences rely completely on text, reading comprehension, and critical writing to prove a student understands a topic. In these fields, the line between using AI as a writing assistant and letting AI do the actual thinking is incredibly thin. As these tools become a permanent part of university life, we must find out if AI is helping students learn or acting as a crutch that damages critical thinking (Abdallah et al., 2025). Therefore, this study investigates how using ChatGPT influences the writing style and subject mastery of students in text-heavy, interpretive majors.

Statement of Problem

The use of ChatGPT in higher education has become an important issue in current academic writing practices, particularly because students are increasingly using artificial intelligence tools to support idea generation, language improvement, translation, and text organisation. Recent studies have shown that ChatGPT can play a positive role in students' learning experiences. For example, Youssef et al. (2024) found that ChatGPT usage positively influenced student engagement, critical thinking abilities, and academic achievement among university students. Similarly, Lo, Hew, and Jong (2024), in their systematic review on ChatGPT and student engagement, reported that ChatGPT has been widely discussed as a transformative yet controversial tool in teaching and learning, particularly in relation to behavioural, emotional, and cognitive engagement. These studies suggest that ChatGPT is no longer merely a writing support tool but has become part of students' academic learning process.

However, the use of ChatGPT in writing also raises several concerns. Although ChatGPT may help learners produce texts more quickly and confidently, students may also become dependent on the tool for surface-level writing support, such as grammar correction, translation, and sentence refinement. Abbas et al. (2024) found that frequent ChatGPT usage may be associated with negative academic outcomes such as procrastination, memory loss, and lower academic performance when students rely on it excessively. This indicates that while ChatGPT can support learning, its use needs to be examined carefully, especially in relation to how learners engage with the deeper aspects of writing. In academic writing, learners are not only expected to produce grammatically accurate sentences, but also to develop meaningful content and organise ideas in a coherent and purposeful way.

In the context of writing, content knowledge and discourse knowledge are two important forms of knowledge that influence the quality of students' written work. Content knowledge refers to the ideas, facts, and information that writers need to develop their writing, while discourse knowledge refers to how writers organise, connect, and communicate those ideas effectively. Bereiter and Scardamalia (1987) explain that expert writers do not merely tell what they know, but transform knowledge by evaluating, reorganising, and adapting ideas according to the writing purpose. This is important because students who use ChatGPT may receive immediate responses or suggested texts, but it is still necessary to understand whether this use is related to their ability to manage content knowledge and discourse knowledge in writing.

Another issue is that learners from different backgrounds may experience and use ChatGPT differently. Gender and academic discipline may influence how learners approach writing tasks, how they seek support, and how they perceive the usefulness of ChatGPT. Abbas et al. (2024) suggested that future studies could compare the dynamics of ChatGPT usage across different fields of knowledge and gender to examine possible differential effects. This recommendation provides a clear direction for further investigation, particularly as students from science and technology disciplines may have different writing needs compared to those from the social sciences

and humanities. Therefore, examining ChatGPT, content knowledge, and discourse knowledge across gender and discipline can offer a more focused understanding of how learners use and perceive ChatGPT in academic writing.

Furthermore, Lo et al. (2024) highlighted the need for future research to examine under-explored aspects of student engagement in ChatGPT-supported learning environments, including self-regulation and critical thinking. This is closely related to writing because learners need to regulate their writing process, evaluate information, and decide how to use AI-generated responses responsibly. Therefore, this study is conducted to explore the influence of ChatGPT on different types of knowledge in writing, particularly content knowledge and discourse knowledge. By examining learners' perceptions and the relationships between ChatGPT and writing knowledge, this study may provide a clearer understanding of how ChatGPT functions as a support tool in academic writing while also highlighting the importance of critical and strategic use among learners.

Objective of Questions and Research Questions

This study is done to explore the influence of ChatGPT on different types of knowledge in writing. Specifically, this study is done to answer the following questions;

- Is there a significant relationship between (a) ChatGPT, (b) content, and (c) discourse knowledge across gender?
- H_{01} : There is no significant relationship between (a) ChatGPT, (b) content, and (c) discourse knowledge across gender
- Is there a significant relationship between (a) ChatGPT, (b) content, and (c) discourse knowledge across disciplines?
- H_{02} : There is no significant relationship between (a) ChatGPT, (b) content, and (c) discourse knowledge across disciplines
- How do learners perceive ChatGPT in writing?
- How do learners perceive the use of content knowledge in writing?
- How do learners perceive the use of discourse knowledge in writing?
- Is there a significant relationship between ChatGPT and content knowledge?

H_{03} : There is no significant relationship between ChatGPT and content knowledge

- Is there a significant relationship between ChatGPT and discourse knowledge?

H_{04} : There is no significant relationship between ChatGPT and discourse knowledge

LITERATURE REVIEW

Theoretical Framework of the Study

Bereiter and Scardamalia's theory of Writing

Bereiter and Scardamalia's (1981) theory of writing presents two categories of writers: the novice and the expert writer. The novice writer is said to undergo the knowledge-telling process. This strategy focuses on retrieving information directly from memory and writing it down with minimal planning or revision. It involves identifying topics, searching memory, and listing relevant knowledge, rather than transforming ideas to suit a rhetorical purpose. Expert writers are said to undergo a knowledge-transforming process when they write. Knowledge transformation is the process of acquiring, modifying, and applying information to create valuable, usable

knowledge, often changing its form from tacit (implicit) to explicit. It involves stages like contextualization, engagement, and internalization to turn data into actionable insights.

Both types of writers use content and discourse knowledge in writing. Content knowledge refers to the facts, concepts, and information within a specific subject area, while discourse knowledge focuses on how language is used to construct meaning, identity, and social reality within specific contexts. Discourse knowledge refers to the knowledge about HOW to communicate the ideas of the content knowledge. According to Bereiter and Scardamalia (1987), novice writers rely on a knowledge-telling process to elaborate ideas, whereas expert writers evaluate their content knowledge before composing their texts. **Discourse knowledge** is knowledge about *how to communicate content effectively in writing*. This knowledge includes the writer's knowledge of the text structure and the genre of the writing task. It also includes knowledge of rhetorical strategies. For the novice writer, the discourse knowledge is limited. Writers may not clearly structure arguments or adapt their writing for an audience. For expert writers, the discourse knowledge guides decisions about *what* content to include, *where* to place it, and *how* to frame it.

ChatGPT in writing

The emergence of artificial intelligence (AI) has transformed academic writing, with ChatGPT becoming one of the most widely used tools among students. Developed by OpenAI, ChatGPT facilitates different stages of the writing process, including idea generation, content development, sentence structure, grammar correction, and editing of written work (Baidoo-Anu & Ansah, 2023). According to studies (Kasneci et al., 2023; Lo, 2023), ChatGPT can help students produce clearer and well-structured writing by offering examples, suggestions for paraphrasing, and organizational guidelines that adhere to academic writing rules. With the help of these characteristics, students may be able to write more efficiently and express ideas more clearly. Although ChatGPT can support the writing process, overreliance on the tool may limit students' ability to evaluate information, develop their own arguments, and apply their knowledge in writing (Tlili et al., 2023). Concerns regarding academic integrity and the degree to which written work represents students' own comprehension and cognitive effort are also raised by the usage of AI-generated text (Cotton et al., 2023). As a result, ChatGPT should be regarded as a writing assistance tool that enhances, rather than replaces, the acquisition of discourse and content knowledge necessary for successful academic writing.

Past Studies

Past Studies on ChatGPT and writing

Previous research indicates that ChatGPT helps students throughout the writing process, not just during proofreading. According to several studies by Mahapatra (2024), Teng (2024), and Meniado et al. (2024); ChatGPT helps students come up with ideas, get formative feedback, organize material, edit drafts, and improve their motivation and writing engagement. Mahapatra (2024) discovered that using ChatGPT as a formative feedback tool enhanced the academic writing abilities of ESL students, especially in terms of producing targeted ideas, making connections between ideas and sentences, structuring content, and enhancing grammatical precision. Similarly, research from Teng (2024) reported that ChatGPT formative feedback influenced the learners' writing motivation, self-efficacy, engagement, and collaborative writing tendency. Additionally, Meniado et al. (2024) discovered that EFL students used ChatGPT for idea organization, brainstorming, outline refinement, concept clarification, and draft editing. These results suggest that ChatGPT serves as a writing assistant that facilitates the development of ideas and the enhancement of text.

Prior research serves as a foundation for examining ChatGPT in connection to discourse and content knowledge. ChatGPT is linked to both content and discourse aspects of writing as evidenced by its stated usefulness for brainstorming, concept clarification, feedback, motivation, idea structure, and draft revision. However, these aspects have rarely been examined explicitly under the construct of content knowledge and discourse knowledge.

But there are several limitations of ChatGPT's contribution to writing. According to Ding et al. (2025), the researchers found that ChatGPT formative feedback improved mechanics, tone, grammar, APA formatting, and overall writing quality; it did not significantly improve content or organization. Students who got both instructor

and ChatGPT input, on the other hand, showed improvement in every area, including organization and content. This implies that ChatGPT may be more effective for language accuracy and general revision, while its usefulness in higher-order writing dimensions such as content development and discourse organization is still unclear. Thus, the present study extends the earlier studies by investigating the impact of ChatGPT on content knowledge and discourse knowledge as two distinct aspects of writing knowledge.

Conceptual Framework of the Study

The conceptual framework of this study is presented in Figure 1 below. This study is rooted in the concepts of content and discourse knowledge in writing by Bereiter and Scardamalia (1987).

Academic writing is a complex process, and writers need to go through several stages in the process to complete the task. The processes are facilitated using writing strategies (Khairuddin et.al., 2021). However, some strategies are more often used than others to complete the assignment. The use of cognitive and metacognitive strategies are used by academic writers when they need to paraphrase information for the task (Rahmat, 2020).

Additionally, this study merges the concepts in content and discourse knowledge by Bereiter and Scardamalia (1987) to correspond with the concepts of the studies by Raoofi et al. (2017). In the context of this study, metacognitive, social, and affective writing strategies are used by writers to solve content knowledge. Next, writers use effort regulation and cognitive strategies to attend to discourse knowledge.

The inclusion of ChatGPT by writers can mirror the behaviour of expert writers described by Bereiter and Scardamalia (1987). The expert writer can apply, modify, and analyse content knowledge, and at the same time have complex discourse knowledge. The study by Youssef et al., (2024). Found that the use of ChatGPT can influence a person's critical thinking abilities, academic achievement, ChatGPT usage, and student engagement. The use of ChatGPT in writing not only facilitates the writing process, but its use also mirrors the behaviour of expert writers. Additionally, this study explores the relationship between ChatGPT and both types of knowledge in writing.

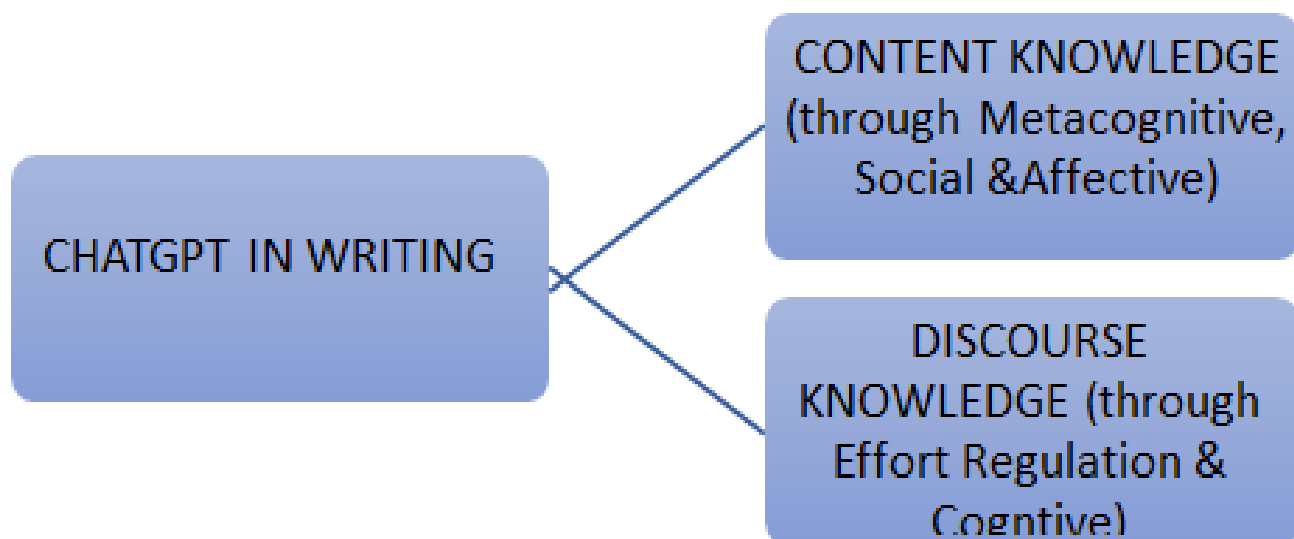


Figure 1- Conceptual Framework of the Study ChatGPT in Writing

METHODOLOGY

This quantitative study is done to explore the influence of ChatGPT on different types of knowledge in writing. A convenient sample of 165 participants responded to the survey. The instrument used is a 5-point Likert-scale survey and is rooted from Raoofi, et.al (2017) & Youssef, et.al (2024) to reveal the variables in Table 3 below. Table 1 below shows the categories used for the Likert scale; 1 is for Strongly Disagree, 2 is for Disagree, 3 is for Undecided, 4 is for Agree, and 5 is for 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	DISCOURSE KNOWLEDGE	Effort Regulation	4	10 (.945)
		Cognitive	6	
C	CONTENT KNOWLEDGE	Metacognitive	10	17 (.960)
		Social	4	
		Affective	3	
D	CHATGPT	Critical thinking abilities	4	16 (.955)
		Academic achievement	4	
		ChatGPT usage	5	
		Student engagement	3	
				43 (.974)

Table 2 shows the distribution of items in the survey. Section B has 10 items on discourse knowledge. Section C has 17 items on Content knowledge. Section D has 16 items on ChatGPT.

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 Alpha range. According to Ahmad et al. (2024), Cronbach Alpha scores between 0.7 to 0.9 are considered acceptable to excellent.

Table 2 also shows the reliability of the survey. The analysis shows a Cronbach alpha of .945 for Discourse knowledge, .960 for Content knowledge, and .955 for ChatGPT. The overall Cronbach alpha for all 43 items is .974; thus, revealing a good reliability of the instrument chosen/used. Further analysis in SPSS is conducted to present findings that 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 generalizability to a larger population. The report 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	33%
		Female	67%
2	Discipline	Science & Technology	43%
		Social Sciences & Humanities	57%

Table 4 presents the demographic profile of the respondents involved in this study. In terms of gender, 33% of the respondents were male, while 67% were female, indicating a relatively balanced gender distribution. Regarding academic clusters, most respondents were from the Social Sciences and Humanities cluster (57%), followed by the Science and Technology cluster (43%).

Inferential Statistics

According to Shah (2024), 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, 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, T-test is done 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 conclude 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) ChatGPT, (b) content, and (c) discourse knowledge across gender?

H_{01} : There is no significant relationship between (a) ChatGPT, (b) content, and (c) discourse knowledge across gender

Table 5: T-Test for (a) ChatGPT, (b) content, and (c) discourse knowledge across gender

Group Statistics					
	Q1GENDER	N	Mean	Std. Deviation	Std. Error Mean
ChatGPT	MALE	55	4.0148	.67625	.09119
	FEMALE	110	4.0057	.62709	.05979
CONTENT_KNOWLEDGE	MALE	55	3.6374	.94191	.12701
	FEMALE	110	3.8316	.74135	.07068
DISCOURSE_KNOWLEDGE	MALE	55	3.6127	.93869	.12657
	FEMALE	110	3.7718	.70426	.06715

Independent Samples Test											
Levene's Test for Equality of Variances				t-test for Equality of Means							
		F	Sig.	t	df	Significance One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
ChatGPT	Equal variances assumed	1.203	.274	.086	163	.466	.932	.00909	.10632	-.20085	.21903
	Equal variances not assumed			.083	101.153	.467	.934	.00909	.10904	-.20721	.22539
CONTENT_KNOWLEDGE	Equal variances assumed	2.806	.096	-1.445	163	.075	.150	-.19412	.13431	-.45933	.07110
	Equal variances not assumed			-1.336	88.430	.093	.185	-.19412	.14535	-.48295	.09472
DISCOURSE_KNOWLEDGE	Equal variances assumed	3.087	.081	-1.220	163	.112	.224	-.15909	.13041	-.41660	.09842
	Equal variances not assumed			-1.110	85.326	.135	.270	-.15909	.14328	-.44396	.12578

A two-sample t-test was performed to compare (a) ChatGPT, (b) content, and (c) discourse knowledge across gender. There were no significant differences for (a) ChatGPT ($p=.932$), (b) content ($p=.150$), and (c) discourse knowledge($p=.224$) across gender. Null hypothesis is rejected for H_{01} .

Findings for Disciplines

This section presents data to answer research question 2: Is there a significant relationship between (a) ChatGPT, (b) content, and (c) discourse knowledge across disciplines?

H_{02} : There is no significant relationship between (a) ChatGPT, (b) content, and (c) discourse knowledge across disciplines

Table 6: T-Test for (a) ChatGPT, (b) content, and (c) discourse knowledge across gender

Group Statistics					
	Q2DIS	N	Mean	Std. Deviation	Std. Error Mean
ChatGPT	S&T	71	3.9850	.62029	.07362
	SS,H & B	94	4.0266	.66039	.06811
CONTENT_KNOWLEDGE	S&T	71	3.7291	.70676	.08388
	SS,H & B	94	3.7954	.89234	.09204
DISCOURSE_KNOWLEDGE	S&T	71	3.6859	.72846	.08645
	SS,H & B	94	3.7436	.83789	.08642

Independent Samples Test											
Levene's Test for Equality of Variances				t-test for Equality of Means							
		F	Sig.	t	df	Significance One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
ChatGPT	Equal variances assumed	.013	.909	-.411	163	.341	.682	-.04156	.10118	-.24135	.15823
	Equal variances not assumed			-.414	155.421	.340	.679	-.04156	.10029	-.23967	.15655
CONTENT_KNOWLEDGE	Equal variances assumed	2.238	.137	-.516	163	.303	.607	-.06629	.12859	-.32020	.18763
	Equal variances not assumed			-.532	162.610	.298	.595	-.06629	.12452	-.31218	.17960
DISCOURSE_KNOWLEDGE	Equal variances assumed	1.241	.267	-.463	163	.322	.644	-.05770	.12465	-.30383	.18843
	Equal variances not assumed			-.472	159.738	.319	.638	-.05770	.12224	-.29912	.18371

A two-sample t-test was performed to compare (a) ChatGPT, (b) content, and (c) discourse knowledge across disciplines. There were no significant differences for (a) ChatGPT ($p=.682$), (b) content ($p=.607$), and (c) discourse knowledge($p=.322$) across gender. Null hypothesis is rejected for H_{02} .

Descriptive Statistics

Why is there a need to report the mean and standard deviation? According to Vetter (2017), the 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 while high SD indicates they are more spread out. It is good to have a high SD.

Findings for ChatGPT

This section presents data to answer research question 3: How do learners perceive ChatGPT in writing?

In the context of this study, this is measured by (i) critical thinking abilities, (ii) academic achievements, (ii) 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.	4.03	0.83
CTQ2 ChatGPT's responses made me doubt their validity, leading me to seek further clarification or evidence.	3.96	0.85
CTQ3 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.	4.03	0.79
CTQ4 I need clarification about the accuracy of ChatGPT's output, which often encourages me to evaluate the information and conduct additional research independently.	4.09	0.76

Table 7 shows how using ChatGPT affects the students' critical thinking skills. Overall, the high average scores, ranging from 3.96 to 4.09 out of 5, show that students do not blindly trust ChatGPT. Instead, they are very cautious and double-check their work. The highest score belongs to item CTQ4 with an average of 4.09, which shows that students feel a strong need to check the accuracy of ChatGPT's answers, and this encourages them to do their own independent research. Similarly, items CTQ1 and CTQ3 both scored an average of 4.03, showing that students actively look for outside sources and alternative viewpoints to make sure they fully understand a topic. Finally, item CTQ2 scored an average of 3.96, revealing that when ChatGPT gives an answer, it often makes students doubt its truthfulness, which pushes them to go look for proof. In short, these numbers prove that instead of making students lazy thinkers, ChatGPT acts as a wake-up call that forces them to think critically and double-check their facts.

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.	3.99	0.79
AAQ2 ChatGPT brings innovative ideas that are ready to be shared with students.	3.98	0.86
AAQ3 Students can anticipate robust writing guidance from ChatGPT.	3.92	0.81
AAQ4 ChatGPT has improved my academic performance.	4.00	0.83

Table 8 shows that respondents generally had positive perceptions of ChatGPT's contribution to academic achievement, as reflected by the high mean scores ranging from 3.92 to 4.00. The highest mean was recorded for the statement that ChatGPT has improved academic performance ($M = 4.00$, $SD = 0.83$), followed closely by the use of ChatGPT to explore alternative viewpoints and sources of information for a more comprehensive understanding of topics ($M = 3.99$, $SD = 0.79$). Respondents also agreed that ChatGPT provides innovative ideas that can be shared with students ($M = 3.98$, $SD = 0.86$) and offers valuable writing guidance ($M = 3.92$, $SD = 0.81$). Overall, the findings suggest that ChatGPT is perceived as a beneficial educational tool that supports learning, enhances academic performance, and encourages knowledge exploration.

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 favorably used today.	4.00	0.80
CUQ2 Students seek help from ChatGPT's assistance in composing essays and articles.	4.07	0.78
CUQ3 ChatGPT helps students in German language translation.	4.25	0.81
CUQ4 Employing ChatGPT significantly improves human productivity.	3.90	0.83
CUQ5 The advent of ChatGPT marks a groundbreaking transformation in Natural Language Processing capabilities.	3.97	0.84

The findings in Table 9 show that learners generally perceived ChatGPT positively as a supportive tool in writing. The highest mean score was recorded for an item ($M = 4.25$, $SD = 0.81$), suggesting that learners particularly valued ChatGPT for language support, especially in translation-related tasks. This finding is meaningful as beginner language learners often require assistance in understanding vocabulary, sentence structure, and meaning during the writing process. In addition, learners also agreed that they seek assistance from ChatGPT when composing essays and articles ($M = 4.07$, $SD = 0.78$), indicating that ChatGPT may function as a writing companion that helps them generate and organize ideas. The lowest mean score was recorded for the item on productivity ($M = 3.90$, $SD = 0.83$), yet the score still reflects a positive perception. Overall, the findings suggest that learners view ChatGPT as a practical and accessible tool that can support writing, translation, and idea development.

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.	3.90	0.97
SEQ2 ChatGPT increases confidence in my ability to conduct research/to search for materials	3.99	0.88
SEQ3 ChatGPT is easy to use and more engaging for me	4.15	0.85

The findings in Table 10 indicate that ChatGPT contributed positively to learners' engagement in writing-related activities. The highest mean score was recorded for the item "ChatGPT is easy to use and more engaging for me" ($M = 4.15$, $SD = 0.85$), suggesting that learners found ChatGPT accessible and engaging in their learning process. This ease of use may help reduce learners' anxiety and encourage them to participate more confidently in writing tasks. Learners also reported that ChatGPT increased their confidence in conducting research or searching for materials ($M = 3.99$, $SD = 0.88$), which shows that ChatGPT may support independent learning and information-seeking behaviour. Although the item "ChatGPT is more interactive, human-like, and engaging for the students" recorded the lowest mean score ($M = 3.90$, $SD = 0.97$), the result still reflects a generally

positive perception. Overall, the findings suggest that ChatGPT can enhance student engagement by making the writing process more interactive, supportive, and less intimidating for learners.

Findings for Content Knowledge

This section presents data to answer research question 4: How do learners perceive the use of content knowledge in writing? In the context of this study, this is measured by (i) metacognitive, (ii) Social and (ii) Affective writing strategies.

Table 11- Mean (M) and Standard Deviation (SD) for MTEACOGNITIVE (MWS)

ITEM	M	SD
MWSQ 1 I organize my ideas prior to writing.	3.50	1.08
MWSQ 2 I revise my writing to make sure that it includes everything I want to discuss in my writing.	3.87	0.98
MWSQ 3 I check my spelling.	4.04	1.02
MWSQ 4 I check my writing to make sure it is grammatically correct.	4.00	1.02
MWSQ 5 I evaluate and re-evaluate the ideas in my essay.	3.74	1.07
MWSQ 6 I monitor and evaluate my progress in writing.	3.76	1.01
MWSQ 7 I revise and edit an essay two or more times before I hand it in to my teacher.	3.84	1.08
MWSQ8 I go through the planning stages in my writing.	3.81	1.05
MWSQ9 I go through the drafting stages in my writing.	3.85	1.04
MWSQ10 I go through the revising and editing stages in my writing.	3.82	1.01

Table 11 presents the mean and standard deviation values for students' metacognitive writing strategies. Overall, the findings indicate that students frequently employ metacognitive strategies during the writing process, with mean scores ranging from 3.50 to 4.04. The highest mean score was recorded for checking spelling ($M = 4.04$, $SD = 1.02$), followed closely by checking grammatical correctness ($M = 4.00$, $SD = 1.02$). This suggests that students place considerable emphasis on reviewing language accuracy in their writing. Students also reported revising their writing to ensure that all intended points were included ($M = 3.87$, $SD = 0.98$) and going through drafting stages ($M = 3.85$, $SD = 1.04$), indicating active engagement in monitoring and improving their written work. Similarly, revising and editing essays multiple times before submission ($M = 3.84$, $SD = 1.08$), going through revising and editing stages ($M = 3.82$, $SD = 1.01$), and planning stages ($M = 3.81$, $SD = 1.05$) obtained relatively high mean scores. In contrast, organising ideas prior to writing recorded the lowest mean score ($M = 3.50$, $SD = 1.08$), suggesting that students are less consistent in planning their ideas before beginning the writing task. Overall, the results indicate that students tend to focus more on monitoring, revising, and editing their writing than on pre-writing planning activities.

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

ITEM	M	SD
SWSQ1 In order to generate ideas for my writing, I usually discuss the writing topic with a friend or classmate.	3.77	1.05

SWSQ 2After revising and editing my essay thoroughly, I ask a friend or my classmate to read and comment on it.	3.61	1.10
SWSQ 3I try to identify friends or classmates whom I can ask for help in my writing.	3.79	1.06
SWSQ 4 When I have trouble writing my essay, I try to do it with my classmates or friends.	3.81	1.08

Table 12 presents the mean and standard deviation values for students' social writing strategies. Overall, the findings indicate a moderately high use of peer-based strategies, with mean scores ranging from 3.61 to 3.81. The highest mean score was recorded for completing writing tasks collaboratively with classmates or friends when facing difficulties ($M = 3.81$, $SD = 1.08$), suggesting that students actively rely on peer support during challenging writing situations. This is closely followed by identifying peers who can assist with writing ($M = 3.79$, $SD = 1.06$) and discussing writing topics with friends or classmates to generate ideas ($M = 3.77$, $SD = 1.05$), indicating that peer interaction plays an important role in the idea-generation stage of writing. Students also reported asking peers to read and provide feedback after revising and editing their essays ($M = 3.61$, $SD = 1.10$), which, although slightly lower than the other items, still reflects a moderate level of engagement in peer review practices. Overall, the results suggest that students moderately depend on social interaction to support different stages of writing, particularly in idea generation and problem-solving, while peer feedback on completed drafts is slightly less frequently practiced.

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

ITEM	M	SD
AWSQ1I try to write an essay in class with confidence and ease	3.37	1.12
AWSQ2I try to relax whenever I feel afraid of writing.	3.67	1.02
AWSQ3I encourage myself to write even when I am afraid of making mistakes	3.79	1.00

The findings in Table 13 show mean (M) and standard deviation (SD) for affective. The highest mean score was recorded for the item AWSQ3I, suggesting that learners tended to encourage themselves to continue writing in spite of their fear of making mistakes. This was followed by item AWSQ2 ($M=3.67$, $SD=1.02$) indicating that learners are trying to manage their anxiety during writing. Meanwhile, the lowest mean score is item AWSQ1 ($M= 3.37$, $SD = 1.12$) suggesting that learners' confidence in writing was present but not strong.

Findings for Discourse Knowledge

This section presents data to answer research question 5: How do learners perceive the use of discourse knowledge in writing? In the context of this study, this is measured by (i) Effort regulation and (ii) Cognitive writing strategies.

Table 14- Mean (M) and Standard Deviation (SD) for EFFORT REGULATION (ERS)

ITEM	M	SD
ERSQ 1I write a lot to develop my writing skills.	3.81	1.09
ERSQ 2I often work hard to do well in my writing even if I don't like German writing tasks.	3.67	1.01
ERSQ 3Even if the writing activities are difficult, I don't give up but try to engage in them.	3.93	0.92
ERSQ 4I concentrate as hard as I can when doing a writing task.	3.91	0.95

The findings in Table 14 present the mean (M) and standard deviation (SD) for effort regulation. The highest mean score was recorded for item ERSQ 3, suggesting that most learners demonstrate persistence and continue engaging in writing tasks despite perceiving them as difficult. This was followed by item ERSQ 4 (M = 3.91, SD = 0.95), indicating that learners exert considerable effort to maintain focus during writing tasks. Meanwhile, item ERSQ 2 recorded the lowest mean score (M = 3.67, SD = 1.01), suggesting that although learners may not particularly enjoy German writing tasks, they still strive to perform well.

Table 15- Mean (M) and Standard Deviation (SD) for COGNITIVE (CWS)

ITEM	M	SD
CWSQ1, I use memorized grammatical elements such as singular and plural forms, verb tenses, prefixes and suffixes, etc, in my writing	3.76	0.90
CWSQ 2I put newly memorized vocabulary in my sentences.	3.69	0.97
CWSQ 3In order to generate ideas for my writing, I usually engage myself in brainstorming.	3.73	0.98
CWSQ 4I use different words that have the same meaning.	3.48	1.05
CWSQ 5I use my experiences and knowledge in my writing.	3.87	0.89
CWSQ 6I try to use effective linking words to ensure clear and logical relationship between sentences or paragraphs	3.76	0.88

Table 15 shows the mean and Standard Deviation (SD) for Cognitive. The highest mean score (M = 3.87, SD = 0.89) was recorded for item CWSQ 5I, indicating that students use their experiences and knowledge in their writing. Two items recorded identical mean scores (M = 3.76), namely CWSQ 1I and CWSQ 6I. These findings indicate that students utilise memorised grammatical elements, such as singular and plural forms, verb tenses, and the use of prefixes and suffixes, in their writing. In addition, students reported attempting to employ effective linking words to ensure clear and logical relationships between sentences and paragraphs. The lowest mean score for the cognitive domain was recorded for item CWSQ 4I (M=3.48), indicating that students use different words with similar meanings in their writing.

Exploratory Statistics

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

To determine if there is a significant association in the mean scores between ChatGPT and writing, the data are analyzed using SPSS for correlations. Results are presented separately in Table 16 below.

Table 16- Correlation between ChatGPT and Different Forms of Knowledge

Correlations				
		ChatGPT	CONTENT KNOWLEDGE	DISCOURSE KNOWLEDGE
ChatGPT	Pearson Correlation	1	.537**	.562**
	Sig. (2-tailed)		<.001	<.001
	N	165	165	165

CONTENT KNOWLEDGE	Pearson Correlation	.537**	1	.874**
	Sig. (2-tailed)	<.001		<.001
	N	165	165	165
DISCOURSE KNOWLEDGE	Pearson Correlation	.562**	.874**	1
	Sig. (2-tailed)	<.001	<.001	
	N	165	165	165
**. Correlation is significant at the 0.01 level (2-tailed).				

Findings for the Relationship between ChatGPT and Content Knowledge

This section presents data to answer research question 6: Is there a significant relationship between ChatGPT and content knowledge?

H₀₃: There is no significant relationship between ChatGPT and content knowledge

With reference to Table 16 above, ChatGPT has a strong, positive relationship with Content knowledge ($r=.537^{**}$) and ($p<.001$). Thus, null hypothesis is rejected for H₀₃.

Findings for ChatGPT and discourse knowledge

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

H₀₁₄ There is no significant relationship between ChatGPT and discourse knowledge

With reference to Table 16 above, ChatGPT has a strong, positive relationship with discourse knowledge ($r=.562^{**}$) and ($p<.001$). Thus, null hypothesis is rejected for H₀₄.

FINDINGS AND DISCUSSION

The findings indicate that students' perceptions of ChatGPT in writing are reflected in their critical thinking, as they recognise the need to verify the accuracy of its output. This, in turn, encourages them to evaluate information critically and engage in further independent research. This aligns with previous studies highlighting that ChatGPT responses may be inaccurate or misleading, thereby requiring critical evaluation, while also fostering students' independent learning and higher-order thinking skills (Dahlkemper et al., 2023). In terms of academic achievement, ChatGPT is found to contribute to improvements in students' performance, supported by prior research reporting positive effects on learning outcomes, writing performance, and higher-order thinking development (Wang & Fan, 2025). Regarding usage, ChatGPT is found to assist students in German language translation, which is consistent with Jiao et al. (2023), who reported that ChatGPT, particularly GPT-4, demonstrates strong machine translation capabilities across languages. For student engagement, the survey findings indicate that students perceive ChatGPT as easy to use and engaging, which is supported by Rahman and Watanobe (2023), who found that students generally view ChatGPT as a user-friendly and engaging learning tool.

The next variable examined was content knowledge. In the metacognitive domain, students actively monitored their spelling and writing to ensure grammatical accuracy when using ChatGPT. This is likely due to possible inaccuracies in ChatGPT outputs, which require critical evaluation and metacognitive monitoring during writing tasks (Urban et al., 2025; Dahlkemper et al., 2023). In the social domain, students frequently engage in discussions with friends or classmates to generate ideas for writing, highlighting the role of peer collaboration in the planning stage. In contrast, seeking feedback from peers after revising and editing essays is less commonly practiced, suggesting lower engagement in peer review at the final stage of writing. This suggests the importance of peer interaction in supporting writing development, although students do not always actively engage in peer

feedback (Pham, 2021). For affective writing strategies, students reported self-encouragement, reduced fear of mistakes, and greater confidence in writing. They also report being able to write essays in class with greater confidence and ease. These findings suggest that learners' writing self-efficacy plays an important role in fostering confidence and persistence in writing tasks (Cheng et al., 2026). In addition, affective strategies such as self-encouragement and managing fear of mistakes appear to help learners reduce writing anxiety and sustain their writing performance despite challenges (Palani & Sulaiman, 2022).

The third variable examined how learners' perceptions of using discourse knowledge in writing are reflected in their effort regulation. The findings show that learners do not give up easily when writing is difficult. They remain engaged in the tasks and persist in their efforts. Even when they do not particularly like writing in German, they still put in effort to perform well. This implies that effort regulation plays an important role in sustaining learners' motivation and persistence in challenging tasks (Pintrich & De Groot, 1990). In terms of cognitive writing strategies, the findings show that learners draw on their experiences and knowledge, use linking words to ensure coherence, and engage in brainstorming to generate ideas for their writing. These strategies are widely recognised as key components of cognitive writing processes that help learners organise ideas, develop content, and improve text coherence (Bhat et al., 2022; Youngerman, 2018).

In general, the findings suggest that ChatGPT plays a supportive role in enhancing students' engagement and higher-order thinking, but its influence on content knowledge and discourse knowledge is not significant, as these areas are mainly developed through learners' own cognitive processes, self-regulation, prior knowledge, and learning experiences (Zimmerman, 2002; Pintrich, 2000; Alexander, 2003; Kasneci et al., 2023).

CONCLUSION

Summary of Findings and Discussions

Overall, the findings suggest that ChatGPT functions as a supportive educational tool, particularly in enhancing students' engagement, critical thinking, higher-order thinking skills, and writing performance. However, its impact on content knowledge and discourse knowledge is not significant, as these areas are more strongly influenced by learners' internal cognitive processes, self-regulation, prior knowledge, and learning experiences. In addition, the results indicate that gender does not significantly affect students' use and acceptance of ChatGPT or its relationship with content and discourse knowledge, which is consistent with previous research. In conclusion, these findings highlight that while ChatGPT supports the writing process, the development of deeper writing knowledge remains largely dependent on learner-related factors rather than demographic differences or tool usage alone.

Implications and Suggestions for Future Research

Theoretical and Conceptual Implications

The findings of this study align with Bereiter and Scardamalia's (1981, 1987) theory of writing, indicating that ChatGPT primarily supports students at the knowledge-telling level, where ideas are generated and organised with limited transformation. This explains its non-significant influence on content and discourse knowledge, which requires deeper knowledge transformation driven by learners' cognitive abilities, self-regulation, and prior knowledge.

Conceptually, the findings suggest that ChatGPT can be integrated into the framework as a supportive tool within writing strategies. While it enhances engagement, critical thinking, and the use of cognitive and metacognitive strategies, it does not directly develop content and discourse knowledge. Instead, these are shaped by learners' metacognitive, social, affective, and effort regulation strategies. Thus, ChatGPT functions as a facilitating rather than determining factor, supporting the writing process without replacing internal cognitive development.

Pedagogical Implications

The pedagogical implication of this study suggests that ChatGPT should be used as a supportive tool in writing instruction rather than a replacement for learning. Educators should guide students to use ChatGPT critically,

particularly by verifying information and reflecting on its outputs, to strengthen their critical thinking and metacognitive skills. In addition, teaching should place greater emphasis on developing students' content and discourse knowledge through activities that promote self-regulation, peer interaction, and effort regulation. This includes encouraging peer feedback, structured writing practice, and explicit instruction on text organisation and rhetorical strategies. Therefore, while ChatGPT can enhance engagement and support the writing process, effective learning still depends on well-designed pedagogical approaches that foster deeper cognitive development.

Suggestions for Future Research

Future research could explore the long-term effects of ChatGPT on students' writing development, particularly regarding content and discourse knowledge, to determine whether continuous use supports deeper knowledge transformation. In addition, experimental studies could be conducted to examine the impact of guided versus unguided use of ChatGPT on students' writing performance and strategy use. Future studies may also investigate learners of different proficiency levels to better understand how ChatGPT supports cognitive and metacognitive processes across varying abilities.

Furthermore, more research is needed to identify effective instructional approaches for integrating ChatGPT to enhance discourse knowledge, such as text organisation and rhetorical strategies. The role of teacher guidance in promoting critical use of ChatGPT and preventing over-reliance should also be examined. Lastly, future studies could explore the use of ChatGPT across different languages and disciplines, as well as issues related to ethical use and student dependency. Researchers should also investigate different patterns of AI use, including prompt strategies, revision practices, and students' ability to evaluate AI-generated content critically.

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to Professor Dr. Noor Hanim Rahmat for her invaluable guidance, insightful advice, and constructive feedback throughout the completion of this project. My sincere appreciation is also extended to the Academy of Language Studies, UiTM, for the continuous support and the provision of excellent facilities that greatly facilitated this work. Finally, I wish to convey my heartfelt thanks to my teammates and the respondents, particularly the Bachelor of German Language students, for their cooperation, commitment, and support throughout this journey.

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