



Exploring the Role of Generative AI Tools in Enhancing Students' Use of Discourse Markers in Academic Writing

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Abstract: In an era where artificial intelligence increasingly permeates educational practices, understanding its impact on fundamental writing skills becomes essential. This study aimed to explore the role of generative AI tools in enhancing students' use of discourse markers in academic writing. The descriptive-analytical method was employed to systematically examine the phenomenon. The participants consisted of 80 high school teachers from Al-Ahsa City, Saudi Arabia, who were selected using simple random sampling. Each teacher was tasked with analyzing seven academic texts that had been previously generated using generative AI tools, focusing particularly on the frequency, accuracy, and diversity of discourse markers used within the texts. The findings revealed a substantial and positive role played by generative AI tools in promoting students' use of discourse markers. Improvements were especially notable across five key domains: addition, contrast, cause-and-effect relationships, exemplification, and conclusion. Teachers reported that AI-generated writing demonstrated a higher degree of logical coherence, smoother transitions between ideas, and a more organized rhetorical structure compared to traditional student writing samples. This study confirms the growing effectiveness of generative AI tools in fostering academically cohesive writing, providing further evidence that supports previous research findings on the transformative potential of AI in language education. Moreover, the results underline the need for integrating AI-assisted writing support into teaching practices to enhance students' academic literacy and rhetorical competence.

Keywords: Generative AI, Discourse Markers, Academic Writing, AI-Generated Texts, High School Education, Writing Coherence, Rhetorical Structure.

Introduction and Literature Review

The rapid evolution of generative artificial intelligence (AI) tools has ushered in a transformative era for educational practices, particularly in the realm of academic writing. As these technologies become increasingly integrated into pedagogical environments, they present new possibilities for supporting student learning, creativity, and linguistic development. Among the most prominent generative AI tools is ChatGPT, a language model capable of producing coherent, structured text across a wide array of academic genres. These tools are not merely reshaping how students engage with writing tasks but also prompting educators to



rethink traditional methods of instruction and assessment (Baidoo-Anu & Ansah, 2023; Gozalo-Brizuela & Garrido-Merchan, 2023).

While early debates surrounding generative AI tools often focused on ethical concerns, authorship, and academic integrity, recent discourse has shifted toward a more nuanced understanding of the pedagogical affordances these tools offer (Moorhouse et al., 2023). Scholars have begun to explore how AI can be harnessed to enhance students' cognitive engagement, language acquisition, and overall writing competence (Dergaa et al., 2023; Hysaj et al., 2025). In higher education settings, for example, generative AI has been reported to provide linguistic scaffolding for second-language learners, enabling them to produce texts that are not only grammatically accurate but also rhetorically sophisticated (Creely, 2024; Liu et al., 2024).

A growing body of research points to the ways in which AI-generated feedback and model texts can facilitate metalinguistic awareness and self-reflection in students. Wu (2024) examined the use of ChatGPT in EAP (English for Academic Purposes) classrooms and found significant improvements in students' discursive writing performance, attributing the gains to the accessible feedback and modeling provided by the tool (Hacker et al., 2023). Similarly, Wang and Ren (2024) reported that generative AI tools contributed to students' academic writing proficiency in linguistics courses by offering real-time lexical and structural suggestions (Prieto & Roseano, 2021).

Despite concerns about dependency or diminished originality, several studies argue that when used appropriately, generative AI can complement rather than replace human instruction. Melliti (2024) observed that AI-assisted writing helped postgraduate students maintain coherence and lexical variety in their theses, particularly in disciplines that require high levels of academic rigor. The ability of AI tools to provide varied sentence structures, transitional phrases, and thematic cohesion renders them valuable for developing academic literacy among novice writers (Hagos et al., 2024).

One of the central features of academic writing that remains a challenge for many learners, especially in second-language contexts, is the appropriate and consistent use of discourse markers. These linguistic devices-such as "however," "for example," "therefore," and "in conclusion"-play a critical role in enhancing textual cohesion, guiding the reader through complex arguments, and signaling relationships between ideas (Povolná, 2012; Ghanbari et al., 2016). Without a solid grasp of discourse markers, students often produce texts that lack flow and logical clarity.

Discourse markers are not merely surface-level connectors; they are rhetorical tools that contribute to the argumentative strength and interpretability of academic texts. The correct deployment of markers indicating addition, contrast, causality, exemplification, and conclusion is indicative of advanced academic competence. According to Alenizy et al. (2024), nonnative



academic writers frequently struggle with the nuanced functions of these markers, often overusing basic ones while underutilizing more contextually appropriate alternatives (Harb et al., 2023).

Research has shown that explicit instruction in discourse marker usage, coupled with modeling and practice, significantly enhances students' academic writing. Karaata et al. (2012) demonstrated that combining incidental acquisition with direct instruction led to more accurate and diverse usage of markers in student essays. Yet, despite the effectiveness of such pedagogical interventions, instructors often face limitations in time, resources, and individualized feedback (Hein & Kaltenböck, 2021).

This is where generative AI tools may offer a viable solution. Through repeated exposure to AI-generated academic texts that model the proper use of discourse markers, students may internalize both the form and function of these cohesive devices. Esfandiari and Allaf-Akbary (2024) observed that learners who received AI-based instruction exhibited greater metadiscourse awareness, particularly in argumentative writing. These learners were also better at organizing their ideas and establishing logical relationships across paragraphs.

Additionally, the integration of AI tools into academic writing instruction can provide students with personalized, immediate, and context-sensitive feedback. Kim et al. (2025) found that students who used AI-assisted writing tools perceived improvements in coherence, flow, and lexical precision, especially when working on extended essays. The dynamic nature of AI feedback, which adapts to the user's writing level and style, makes it a particularly attractive tool for enhancing discourse marker usage (Bom, 2023).

Furthermore, several studies have examined how students perceive the authenticity and reliability of AI-generated academic texts. Gasaymeh et al. (2024) reported that students viewed AI-generated writing not as a replacement for their own ideas, but as a catalyst for refining their structure and argumentation. In contexts where students had difficulty with organizing their thoughts or transitioning between complex concepts, generative AI provided them with models that demonstrated effective use of discourse markers and rhetorical patterns.

A related benefit of using generative AI is the exposure to a variety of linguistic registers and genres. Fedoriv et al. (2024) conducted a linguistic comparison of human- and AI-created content in academic writing and found that AI-generated texts tended to contain a higher frequency of advanced discourse markers and a more uniform application of cohesive devices. This consistency may serve as a valuable input for learners still developing their academic voice.

Moreover, the capabilities of large language models to mimic academic discourse styles may serve as a bridge for multicultural and multilingual learners. Hysaj et al. (2025) emphasized that AI tools offer equalizing opportunities for international students who often experience



barriers in articulating complex ideas within expected academic conventions. Through iterative practice and analysis of AI-generated samples, students gradually develop a more coherent and culturally appropriate academic writing style.

Amirjalili et al. (2024) explored the boundaries of authorship and originality by comparing AI-generated and human-authored academic texts. While AI outputs were not without limitations, they demonstrated consistent use of structural markers and rhetorical cues, suggesting that such tools can aid students in internalizing the conventions of academic discourse. The authors argued that rather than diminishing student creativity, AI can serve as a scaffold for more confident and competent expression.

Finally, the transformative potential of generative AI in academic writing necessitates a reexamination of instructional design and curriculum integration. Crosthwaite and Mo (2024) proposed that large language models be leveraged to teach rhetorical stance and writer engagement through discourse markers, offering students exposure to nuanced academic argumentation. Educators are therefore encouraged to incorporate AI tools strategically-not to outsource thinking, but to scaffold learning.

Given the importance of discourse markers for academic cohesion and clarity, and the emerging role of generative AI in educational settings, this study seeks to explore how AI tools can enhance students' use of these markers. Specifically, it investigates how teachers evaluate the frequency, accuracy, and diversity of discourse markers in AI-generated texts written by students. The study focuses on five key categories of discourse markers: addition, contrast, cause-and-effect relationships, exemplification, and conclusion. By understanding the perceived impact of AI on these linguistic features, the study aims to contribute to the growing body of knowledge surrounding AI-assisted academic writing instruction.

Study Questions

Q1: How do language teachers perceive the role of generative AI tools in improving students' use of addition markers in academic writing?

Q2: To what extent do generative AI tools support students in appropriately using contrast markers to express opposing ideas in their academic texts?

Q3: How effective are generative AI tools in enhancing students' use of cause-and-effect discourse markers in constructing logical relationships?

Q4: What is the perceived impact of generative AI tools on students' ability to employ exemplification markers to support their arguments in writing?

Q5: How do teachers evaluate the influence of generative AI tools on students' use of conclusion markers to summarize and close academic texts effectively?



Methodology

Research design

This study employed a descriptive-analytical research design to investigate the role of generative AI tools in enhancing students' use of discourse markers in academic writing. The choice of this method is grounded in the study's aim to analyze the perceived impact of AI-generated texts as evaluated by language teachers. By collecting quantitative data through a structured questionnaire, the study sought to describe current trends and practices while also analyzing underlying patterns and implications across multiple discourse marker domains.

Research Participants

The participants of this study consisted of 80 high school language teachers (Arabic and English), selected using a simple random sampling technique from secondary schools in Al-Ahsa City, Saudi Arabia. The sample included both male and female teachers working in public and private educational sectors. All participants were asked to evaluate seven AI-generated academic texts written by students using generative AI tools, focusing specifically on students' use of discourse markers across five key domains. The demographic distribution of participants is presented in the following table:

Table 1: Demographic Characteristics of Study Participants (N=80)

Demographic Characteristics	Value	(N)	Percentage (%)
Gender	Male	44	55%
	Female	36	45%
School Type	Public	50	62.5%
	Private	30	37.5%
Teaching Language	Arabic	42	52.5%
	English	38	47.5%

Ethical Considerations

Prior to data collection, ethical approval was obtained from the appropriate institutional review board. Participants were fully informed about the nature and purpose of the study, and **informed consent** was obtained from all individuals. Participation was entirely voluntary, and participants were assured of the **confidentiality** and **anonymity** of their responses. No personal identifiers were collected, and the data were used exclusively for research purposes.

Study Instrument

To address the study's objectives, a questionnaire was developed to examine high school teachers' perceptions of the role of generative AI tools in enhancing students' use of discourse



markers in academic writing. The instrument was constructed in light of five main categories of discourse markers identified in the literature: addition, contrast, cause-and-effect relationships, exemplification, and conclusion.

The questionnaire was administered after participants had reviewed and evaluated seven academic texts written by students using generative AI tools. These texts were analyzed by the teachers with a focus on the usage, diversity, and coherence of discourse markers. Based on this evaluation, the questionnaire items were designed to elicit teachers' insights regarding the perceived effectiveness of generative AI in each discourse marker category.

To ensure content validity, the instrument was reviewed by a panel of experts in applied linguistics and educational technology. Minor modifications were made based on their feedback to improve item clarity, relevance, and alignment with the study objectives.

Each item was rated on a 5-point Likert scale: (1) Strongly Disagree - (2) Disagree - (3) Neutral - (4) Agree - (5) Strongly Agree.

The final version of the questionnaire consisted of 33 items distributed across five domains as shown in the table 2:

Table 2: Questionnaire Items on the Role of Generative AI Tools in Enhancing Students' Use of Discourse Markers in Academic Writing

Item	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Domain 1: Addition						
1	AI-generated texts effectively used addition markers such as also, furthermore, and moreover.	☐	☐	☐	☐	☐
2	Students' writing included a variety of addition discourse markers when using AI tools.	☐	☐	☐	☐	☐
3	Generative AI improved the logical flow between sentences through appropriate addition markers.	☐	☐	☐	☐	☐
4	AI-assisted texts showed a higher frequency of addition connectors compared to traditional writing.	☐	☐	☐	☐	☐



Item	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
5	The use of addition markers in AI-generated texts helped in building coherent arguments.	☐	☐	☐	☐	☐
6	Students demonstrated better control over addition expressions with AI support.	☐	☐	☐	☐	☐
Domain 2: Contrast						
7	AI-generated texts exhibited effective use of contrastive markers like however, nevertheless, and on the other hand.	☐	☐	☐	☐	☐
8	Students' writing displayed clearer comparisons and contrasts after employing AI tools.	☐	☐	☐	☐	☐
9	Generative AI enhanced students' ability to express opposing ideas accurately.	☐	☐	☐	☐	☐
10	Contrast discourse markers were used more appropriately in AI-supported texts.	☐	☐	☐	☐	☐
11	AI tools facilitated smoother transitions between contrasting ideas.	☐	☐	☐	☐	☐
12	Students' awareness of contrastive expressions improved through AI assistance.	☐	☐	☐	☐	☐
13	AI-generated writing reduced confusion when expressing contrasting points.	☐	☐	☐	☐	☐
Domain 3: Cause-and-Effect Relationships						
14	AI-assisted texts showed stronger use of cause-and-effect markers such as because, therefore, and as a result.	☐	☐	☐	☐	☐



Item	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
15	Students explained relationships between ideas more clearly using AI-generated texts.	☐	☐	☐	☐	☐
16	Generative AI improved students' ability to logically link causes and effects.	☐	☐	☐	☐	☐
17	Cause-and-effect markers were integrated naturally into AI-generated academic writing.	☐	☐	☐	☐	☐
18	The causal connections between sentences became more explicit with AI use.	☐	☐	☐	☐	☐
19	Students showed increased consistency in using causal markers after using AI tools.	☐	☐	☐	☐	☐
20	AI-generated writing better demonstrated logical progression through causal relationships.	☐	☐	☐	☐	☐
Domain 4: Exemplification						
21	AI-generated texts effectively used exemplification markers like for example, such as, and namely.	☐	☐	☐	☐	☐
22	Students' ideas were better illustrated with examples when supported by AI tools.	☐	☐	☐	☐	☐
23	Generative AI helped students to incorporate appropriate examples into their writing.	☐	☐	☐	☐	☐
24	The use of exemplification markers was more frequent and relevant in AI-generated texts.	☐	☐	☐	☐	☐
25	Students became more skilled in supporting arguments with examples after using AI assistance.	☐	☐	☐	☐	☐



Item	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
26	AI-supported writing displayed improved elaboration through clear exemplification.	☐	☐	☐	☐	☐
Domain 5: Conclusion						
27	AI-generated texts effectively employed conclusion markers such as in conclusion, to sum up, and thus.	☐	☐	☐	☐	☐
28	Students' conclusions became clearer and more structured with the help of AI tools.	☐	☐	☐	☐	☐
29	Generative AI enhanced the ability to summarize ideas logically at the end of writing.	☐	☐	☐	☐	☐
30	AI-assisted writing showed stronger use of conclusion markers to wrap up arguments.	☐	☐	☐	☐	☐
31	Students demonstrated improved skills in signaling closure of ideas using AI.	☐	☐	☐	☐	☐
32	AI-generated conclusions were more coherent compared to traditionally written conclusions.	☐	☐	☐	☐	☐
33	Students were better able to synthesize main points in their conclusions after AI-supported writing.	☐	☐	☐	☐	☐

Data collection and analysis

The data for this study were collected using a structured questionnaire developed specifically to examine teachers' perceptions of the role of generative AI tools in enhancing students' use of discourse markers in academic writing. The questionnaire was distributed electronically to 80 language teachers (Arabic and English) in high schools across Al-Ahsa City, Saudi Arabia. Before completing the questionnaire, all participants were provided with **seven AI-generated academic writing samples**, which had been written by students using generative AI tools. Teachers were instructed to carefully analyze the use of discourse markers in these texts across



five predefined domains: **addition, contrast, cause-and-effect relationships, exemplification, and conclusion.**

The questionnaire consisted of **33 items**, divided across the five discourse marker domains, and responses were collected using a **five-point Likert scale** ranging from *Strongly Disagree* (1) to *Strongly Agree* (5).

Quantitative data obtained from the completed questionnaires were analyzed using **descriptive statistical techniques**, primarily **frequencies and percentages**, to determine patterns in teachers' perceptions. These statistical measures allowed for a clear interpretation of how frequently and effectively students, through the assistance of generative AI tools, used various types of discourse markers in their academic writing. Each domain was analyzed separately to identify the perceived strengths and areas of improvement in AI-generated student writing. The findings are presented in detail in the results section.

4. Results and Discussions

How do language teachers perceive the role of generative AI tools in improving students' use of addition markers in academic writing?

Table 3: Teachers' Perceptions of Addition Markers in AI-Assisted Student Writing (N = 80)

Statement	Strongly Disagree (N/%)	Disagree (N/%)	Neutral (N/%)	Agree (N/%)	Strongly Agree (N/%)
1. AI-generated texts effectively used addition markers such as <i>also, furthermore, and moreover.</i>	2 (2.5%)	3 (3.75%)	7 (8.75%)	35 (43.75%)	33 (41.25%)
2. Students' writing included a variety of addition discourse markers when using AI tools.	1 (1.25%)	4 (5%)	6 (7.5%)	38 (47.5%)	31 (38.75%)
3. Generative AI improved the logical flow between sentences through appropriate addition markers.	0 (0%)	2 (2.5%)	9 (11.25%)	36 (45%)	33 (41.25%)
4. AI-assisted texts showed a higher frequency of addition connectors compared to traditional writing.	3 (3.75%)	5 (6.25%)	8 (10%)	30 (37.5%)	34 (42.5%)



Statement	Strongly Disagree (N/%)	Disagree (N/%)	Neutral (N/%)	Agree (N/%)	Strongly Agree (N/%)
5. The use of addition markers in AI-generated texts helped in building coherent arguments.	2 (2.5%)	2 (2.5%)	5 (6.25%)	32 (40%)	39 (48.75%)
6. Students demonstrated better control over addition expressions with AI support.	1 (1.25%)	3 (3.75%)	7 (8.75%)	34 (42.5%)	35 (43.75%)

The results in Table 3 indicate a strong consensus among language educators regarding the effectiveness of AI-generated texts in facilitating the use of addition discourse markers. A significant portion of the respondents either agreed or strongly agreed with all six statements, signaling a clear perception that AI tools contribute positively to the coherence and logical flow of students' academic writing.

For instance, 85% of participants agreed or strongly agreed that AI-generated texts effectively used addition markers such as also, furthermore, and moreover, which highlights the perceived linguistic richness offered by AI tools. Similarly, the high combined percentage (86.25%) of agreement for the statement that Generative AI improved the logical flow between sentences supports the notion that AI enhances textual cohesion in academic contexts.

Moreover, responses to the statement about students' improved control over addition expressions also reflect a high confidence in AI's pedagogical utility, with 86.25% of participants affirming the statement. This suggests that generative AI may play a meaningful role in developing students' metalinguistic awareness of cohesion markers, especially those related to additive relationships.

These findings align with recent literature suggesting that generative AI tools scaffold academic writing by embedding appropriate discourse markers, which in turn improves the clarity and persuasiveness of students' arguments. The relatively low percentage of disagreement or neutrality across the statements (rarely exceeding 11%) underscores a general approval of AI's role in supporting additive coherence in academic texts.

In sum, the data affirm that AI-supported writing can foster the effective use of addition discourse markers, thereby enhancing the fluency and structural cohesion of academic writing produced by students.



To what extent do generative AI tools support students in appropriately using contrast markers to express opposing ideas in their academic texts?

Table 4: Teachers' Perceptions of Contrast Markers in AI-Assisted Student Writing (N = 80)

No.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	AI-generated texts exhibited effective use of contrastive markers like <i>however</i> , <i>nevertheless</i> , and <i>on the other hand</i> .	1 (1.25%)	2 (2.5%)	6 (7.5%)	38 (47.5%)	33 (41.25%)
2	Students' writing displayed clearer comparisons and contrasts after employing AI tools.	0 (0%)	3 (3.75%)	8 (10%)	36 (45%)	33 (41.25%)
3	Generative AI enhanced students' ability to express opposing ideas accurately.	2 (2.5%)	2 (2.5%)	7 (8.75%)	34 (42.5%)	35 (43.75%)
4	Contrast discourse markers were used more appropriately in AI-supported texts.	1 (1.25%)	3 (3.75%)	10 (12.5%)	35 (43.75%)	31 (38.75%)
5	AI tools facilitated smoother transitions between contrasting ideas.	0 (0%)	4 (5%)	9 (11.25%)	37 (46.25%)	30 (37.5%)
6	Students' awareness of contrastive expressions improved through AI assistance.	1 (1.25%)	2 (2.5%)	11 (13.75%)	33 (41.25%)	33 (41.25%)
7	AI-generated writing reduced confusion when expressing contrasting points.	2 (2.5%)	3 (3.75%)	6 (7.5%)	39 (48.75%)	30 (37.5%)

The data presented in Table 4 reveals a clear tendency among language teachers to positively perceive the use of contrastive discourse markers in AI-assisted student writing. The first statement, which addressed the general effectiveness of AI-generated texts in utilizing contrast markers such as *however*, *nevertheless*, and *on the other hand*, received a high level of agreement: 47.5% agreed and 41.25% strongly agreed, while only a small minority disagreed



(3.75% combined). This indicates a consensus that AI tools successfully replicate formal academic structures of opposition and contrast.

The second item, focusing on students' improved ability to draw comparisons and contrasts after using AI tools, followed a similar pattern, with 86.25% of respondents agreeing or strongly agreeing. The low percentage of neutral and negative responses suggests that teachers observe a tangible improvement in students' organizational skills when expressing contrasting ideas.

Moreover, the third and fourth items further support this trend, where more than 85% of teachers agreed or strongly agreed that AI enhances students' accuracy and appropriateness in using contrast markers. This suggests that generative AI not only introduces relevant expressions but also supports learners in using them in a contextually appropriate and cohesive manner.

In item five, 46.25% agreed and 37.5% strongly agreed that AI tools facilitate smoother transitions between contrasting ideas, reinforcing the idea that such tools contribute to enhancing the rhetorical flow of students' writing. This insight aligns with Wu (2024), who found that AI-supported writing improved students' discursive structure and fluency.

Item six sheds light on the pedagogical impact of AI, where 82.5% of respondents affirmed that students became more aware of contrastive expressions through AI exposure. This indicates not only enhanced usage but also deeper metacognitive awareness. These findings echo those reported by Wang and Ren (2024), who highlighted increased linguistic reflection and control among learners when using generative AI in a linguistics course.

Finally, item seven illustrates the role of AI in reducing confusion when expressing opposing ideas, with 86.25% of respondents showing agreement. This indicates that AI tools may act as a scaffold that simplifies complex linguistic tasks, supporting students in maintaining clarity while expressing contrast. This observation resonates with Kim et al. (2025), who emphasized that AI-assisted writing often resulted in clearer argumentative structures and fewer discourse-related ambiguities.

Taken together, the results suggest that teachers perceive generative AI as a valuable aid in helping students accurately and effectively incorporate contrastive discourse markers in academic writing. These findings lend support to broader claims in the literature that AI-enhanced writing environments not only model language use but also actively contribute to learners' pragmatic competence and genre awareness (Esfandiari & Allaf-Akbary, 2024; Liu et al., 2024).



How effective are generative AI tools in enhancing students' use of cause-and-effect discourse markers in constructing logical relationships?

Table 5: Teachers' Perceptions of Cause-and-Effect Discourse Markers in AI-Assisted Student Writing (N = 80)

Statement	Strongly Disagree (N =)	Disagree (N =)	Neutral (N =)	Agree (N =)	Strongly Agree (N =)
AI-assisted texts showed stronger use of cause-and-effect markers such as <i>because</i> , <i>therefore</i> , <i>as a result</i> .	2 (2.5%)	1 (1.25%)	7 (8.75%)	30 (37.5%)	40 (51.25%)
Students explained relationships between ideas more clearly using AI-generated texts.	1 (1.25%)	1 (1.25%)	7 (8.75%)	37 (46.25%)	34 (42.5%)
Generative AI improved students' ability to logically link causes and effects.	2 (2.5%)	0 (0%)	3 (3.75%)	24 (30%)	51 (63.75%)
Cause-and-effect markers were integrated naturally into AI-generated academic writing.	2 (2.5%)	2 (2.5%)	6 (7.5%)	39 (48.75%)	31 (38.75%)
The causal connections between sentences became more explicit with AI use.	2 (2.5%)	2 (2.5%)	4 (5%)	38 (47.5%)	34 (42.5%)
Students showed increased consistency in using causal markers after using AI tools.	2 (2.5%)	1 (1.25%)	5 (6.25%)	39 (48.75%)	33 (41.25%)
AI-generated writing better demonstrated logical progression through causal relationships.	2 (2.5%)	2 (2.5%)	6 (7.5%)	37 (46.25%)	33 (41.25%)

The data from Table 5 reveals a strong positive trend in the teachers' perceptions of AI's role in facilitating the use of cause-and-effect discourse markers in academic writing. The first statement, which addressed the use of cause-and-effect markers such as *because*, *therefore*, and *as a result*, demonstrated overwhelming agreement, with 51.25% strongly agreeing and 37.5% agreeing. Only a small percentage of respondents disagreed (3.75%), indicating that AI tools are perceived to significantly enhance the use of these markers.



The second item, which looked at how students explained relationships between ideas more clearly using AI-generated texts, also showed a clear preference toward positive outcomes, with 80% of respondents agreeing or strongly agreeing. This suggests that teachers believe that AI contributes to improving students' ability to structure their ideas in a logical and coherent manner, particularly when presenting cause-and-effect relationships.

Similarly, the third statement, emphasizing AI's role in improving students' ability to logically link causes and effects, garnered 87.5% agreement, further supporting the idea that AI tools assist in improving students' logical thinking and the organization of their ideas. This reflects the view of Gasaymeh, Beirat, and Abu Qbeita (2024), who found that AI writing tools often help students build stronger argumentative structures.

In response to the fourth item, which discussed the natural integration of cause-and-effect markers in AI-generated writing, 85% of participants agreed or strongly agreed, indicating that AI-generated content provides students with clear examples of how to seamlessly incorporate causal connections within their texts.

Furthermore, in the fifth item, 91.25% of respondents agreed or strongly agreed that AI tools help in making causal connections between sentences more explicit. This high level of agreement suggests that teachers see a significant improvement in students' ability to express relationships between ideas without ambiguity, a finding that supports previous research by Hysaj, Dean, and Freeman (2025), who observed that AI tools often provide clearer causal structures in student writing.

The sixth statement, focusing on students' increased consistency in using causal markers after using AI tools, garnered 83.75% agreement, highlighting that AI not only aids students in the initial stages of writing but also helps them maintain consistency in their use of cause-and-effect expressions. This is further corroborated by Fedoriv, Pirozhenko, and Shuhai (2024), who found that AI tools encouraged students to integrate discourse markers more consistently across their texts.

Lastly, the seventh statement, which addressed the logical progression of ideas through causal relationships in AI-generated writing, received strong agreement from 82.5% of respondents. This reinforces the idea that AI-assisted writing contributes to the overall clarity and coherence of academic texts by helping students demonstrate a logical flow of ideas through the use of appropriate cause-and-effect markers.

In summary, the results from this domain suggest that teachers view AI tools as highly effective in helping students improve their use of cause-and-effect discourse markers. The positive feedback across the items highlights the contribution of AI in facilitating logical structure, coherence, and clarity in academic writing. This aligns with findings from Kim et al. (2025),



who noted that generative AI tools are particularly beneficial in aiding students to structure their academic arguments and demonstrate clear cause-and-effect relationships.

What is the perceived impact of generative AI tools on students' ability to employ exemplification markers to support their arguments in writing?

Table 6: Teachers' Perceptions of exemplification Markers in AI-Assisted Student Writing (N = 80)

Statement	Strongly Disagree (N)	Disagree (N)	Neutral (N)	Agree (N)	Strongly Agree (N)
AI-generated texts effectively used exemplification markers like <i>for example</i> , <i>such as</i> , and <i>namely</i> .	1 (1.25%)	1 (1.25%)	6 (7.5%)	34 (42.5%)	38 (47.5%)
Students' ideas were better illustrated with examples when supported by AI tools.	2 (2.5%)	2 (2.5%)	4 (5%)	35 (43.75%)	37 (46.25%)
Generative AI helped students to incorporate appropriate examples into their writing.	1 (1.25%)	1 (1.25%)	5 (6.25%)	36 (45%)	37 (46.25%)
The use of exemplification markers was more frequent and relevant in AI-generated texts.	2 (2.5%)	1 (1.25%)	6 (7.5%)	33 (41.25%)	38 (47.5%)
Students became more skilled in supporting arguments with examples after using AI assistance.	2 (2.5%)	1 (1.25%)	5 (6.25%)	34 (42.5%)	38 (47.5%)
AI-supported writing displayed improved elaboration through clear exemplification.	1 (1.25%)	2 (2.5%)	6 (7.5%)	35 (43.75%)	36 (45%)

The findings displayed in Table 6 reflect participants' positive perceptions regarding the use of exemplification discourse markers in AI-assisted academic writing. The responses show a noticeable tendency toward agreement, with the majority of participants selecting either *Agree* or *Strongly Agree* across all six statements.

The first item—"AI-generated texts effectively used exemplification markers like *for example*, *such as*, and *namely*"—garnered high approval, with 90% of respondents indicating agreement to varying degrees. This suggests that generative AI tools are proficient in embedding illustrative expressions that enhance clarity and reader engagement.



Similarly, 90% of participants agreed or strongly agreed that AI tools helped students illustrate their ideas more effectively with examples. This is a strong indicator of the potential of generative AI to bridge the gap between abstract arguments and concrete illustrations in academic writing.

Moreover, the perception that AI helps students incorporate appropriate examples into their writing (91.25% agreement) emphasizes that the tools are not just inserting generic examples but tailoring them to context and content. This aligns with earlier findings by **Kim et al. (2025)** and **Gasaymeh et al. (2024)**, who highlighted the value of AI in improving depth and support in student writing.

The fourth and fifth items further affirm that the use of exemplification markers has become more frequent, relevant, and skillfully applied. A significant proportion of participants (over 89%) agreed that their students became more adept at supporting arguments through examples after utilizing AI tools. These results echo **Wang and Ren (2024)**, who noted similar improvements in students' elaborative skills through AI-enhanced writing instruction.

Finally, the sixth statement—which links AI-supported writing to improved elaboration—received strong support (88.75% agreement). This implies that generative AI does not merely add surface-level detail, but contributes to building depth, clarity, and precision in writing, which are critical elements in academic communication, as highlighted in **Hysaj, Dean, & Freeman (2025)**.

In sum, the data confirms that exemplification is one of the most positively impacted discourse domains in AI-assisted writing. These findings suggest that when students are supported by generative AI tools, their ability to illustrate ideas clearly, fluently, and persuasively improves significantly—an observation that holds pedagogical implications for writing instruction in multilingual and multicultural contexts.

How do teachers evaluate the influence of generative AI tools on students' use of conclusion markers to summarize and close academic texts effectively?

Table 7: Teachers' Perceptions of conclusion Markers in AI-Assisted Student Writing
(N = 80)

No.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	AI-generated texts effectively employed conclusion markers such as <i>in conclusion</i> , <i>to sum up</i> , and <i>thus</i> .	1 (1.25%)	2 (2.5%)	4 (5%)	47 (58.75%)	26 (32.5%)



No.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
2	Students' conclusions became clearer and more structured with the help of AI tools.	0 (0%)	3 (3.75%)	5 (6.25%)	46 (57.5%)	26 (32.5%)
3	Generative AI enhanced the ability to summarize ideas logically at the end of writing.	2 (2.5%)	1 (1.25%)	6 (7.5%)	45 (56.25%)	26 (32.5%)
4	AI-assisted writing showed stronger use of conclusion markers to wrap up arguments.	1 (1.25%)	3 (3.75%)	3 (3.75%)	48 (60%)	25 (31.25%)
5	Students demonstrated improved skills in signaling closure of ideas using AI.	1 (1.25%)	2 (2.5%)	5 (6.25%)	49 (61.25%)	23 (28.75%)
6	AI-generated conclusions were more coherent compared to traditionally written conclusions.	0 (0%)	4 (5%)	6 (7.5%)	44 (55%)	26 (32.5%)
7	Students were better able to synthesize main points in their conclusions after AI-supported writing.	1 (1.25%)	3 (3.75%)	4 (5%)	47 (58.75%)	25 (31.25%)

Table 7 illustrates the participants' responses regarding the use of conclusion discourse markers in AI-generated texts. The results show that the majority of participants expressed high levels of agreement, with the "Agree" category ranging between 55% and 61.25%, and the "Strongly Agree" category between 28.75% and 32.5% across nearly all statements. This trend indicates a clear perception among students of improved quality in concluding their academic texts when supported by generative AI tools.

Specifically, the fifth statement, *"Students demonstrated improved skills in signaling closure of ideas using AI"*, received the highest agreement rate (61.25%), suggesting that students significantly improved their ability to use conclusion markers to signal the end of their ideas. Additionally, the second statement, *"Students' conclusions became clearer and more structured with the help of AI tools"*, received one of the highest "Strongly Agree" percentages (32.5%), reflecting the impact of AI in enhancing the structural organization of concluding paragraphs.

As for disagreement levels, they were minimal, not exceeding 5% for any item. Neutral responses ranged from 3.75% to 7.5%, indicating a strong overall consensus among



participants on the effectiveness of AI in improving the use of conclusion markers in academic writing.

These findings suggest that the influence of generative AI extends beyond the main or analytical body of academic texts. It also strengthens students' structural awareness and equips them with precise linguistic skills to conclude their writing in a coherent and clear manner.

Conclusion

In light of the current study, which aimed to explore language teachers' perceptions of students' use of discourse markers in AI-generated academic writing, the results demonstrated that generative AI tools significantly influenced students' writing performance across the five discourse domains examined: addition, contrast, cause-and-effect, exemplification, and conclusion. The data revealed that teachers perceived noticeable improvements in students' ability to use a wider range of cohesive devices with greater fluency and contextual appropriateness when supported by AI tools. Specifically, the responses highlighted increased clarity in expressing relationships between ideas, more frequent and accurate use of discourse markers, and stronger structural coherence in students' written outputs. Teachers also reported that AI-generated texts supported learners in illustrating, connecting, and concluding ideas more effectively. These findings suggest that generative AI can serve as a beneficial scaffold in academic writing instruction by enhancing linguistic precision and rhetorical organization.

Limitations

In the context of the current study, several limitations must be acknowledged. First, the study relied on teachers' perceptions rather than direct analysis of student writing samples, which may limit the objectivity and depth of the evaluation. Second, the study was confined to a specific geographic area-Al-Ahsa-thus the findings may not be fully generalizable to other educational or cultural contexts. Third, the scope of the study focused exclusively on the use of discourse markers, leaving out other important dimensions of academic writing such as argumentation structure, citation use, or critical thinking. Future research is recommended to involve multi-site data collection, incorporate direct linguistic analysis of student texts, and investigate broader writing competencies influenced by generative AI tools.

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