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Navigating AI for cohesion: a Qualitative analysis of preparatory paragraphs in an ELT context

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ABSTRACT

Despite the proliferation of research on educational technology, a scarcity of studies has systematically examined the development of technology skills for employing AI-generated cohesion devices, particularly in the preparatory paragraphs of academic writing within English Language Teaching (ELT). Addressing this gap, this study adopted a qualitative descriptive approach, incorporating thematic and textual analysis. Data were drawn from the introductory paragraphs of final project essays authored by undergraduate students in an English Department during the 2020-2021 academic year. Analysis revealed a total of 183 cohesive devices. The predominant type was collocation (54.87%), followed by repetition (23.10%), reference (11.19%), and conjunction (10.83%). Furthermore, while students were found to utilize AI-supported writing tools—including ChatGPT, Grammarly, QuillBot, and DeepL—their engagement was largely confined to a limited range of prominent platforms, suggesting underutilization of the broader ecosystem of AI writing technologies. Student interaction with these tools was often unintentional, yet it did not preclude the active application of critical thinking. Key indicators of this critical engagement included Brainstorming, Structured Questioning, Idea Selection, and Strategic Choice, which delineate the process by which students adapt AI-generated suggestions. This adaptive process aligns with the Sustainable Development Goal (SDG) of Quality Education by fostering inclusive and equitable access to digital literacy and higher-order thinking skills. The study contributes to the fields of Educational Technology and Digital Pedagogy by elucidating how AI tools can be harnessed to support critical and creative thinking within academic writing instruction.

Keywords: *Artificial Intelligence, Academic Writing, Essay, English Language Teaching, Cohesion Devices*

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Introduction

Technology Enhanced Language Learning (TELL) has transformed English language teaching (ELT) by integrating mobile devices, multimedia, and AI-driven tools to make learning more interactive and supportive (Adipat, 2021; Hu et al., 2025;). In academic writing—especially in higher education—introductory paragraphs play a crucial role in presenting the topic, thesis, and logical flow of ideas (Li & Huang, 2022; Zhang et al., 2022). Achieving this flow requires effective use of cohesion devices such as conjunctions, reference words, and lexical links (Alawerdy & Alalwi, 2022). But, many L2 learners struggle with cohesion, often overusing certain connectors or failing to link ideas meaningfully (Apridayani & Waluyo, 2025; Baharudin et al., 2023)

AI-powered writing assistants like Grammarly, QuillBot, ChatGPT, and Google Bard are increasingly used to support cohesion by suggesting linking words, improving lexical variety, and refining sentence flow (Bareq Raad Raheem et al., 2023; Livberber & Ayvaz, 2023). However, studies warn that over-reliance on these tools may limit independent mastery of

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cohesion principles (Hammad, 2023). Moreover, little is known about how pre-service teachers in ELT contexts critically adapt AI-generated cohesion strategies to their writing rather than accepting them passively.

Addressing this gap is urgent as AI becomes embedded in academic writing practices, influencing not only text quality but also students' long-term writing competence. This study investigates how pre-service teachers use AI tools to improve cohesion in introductory paragraphs, examining (1) the tools and methods they employ, (2) the cohesion devices present in their essays, and (3) how AI-generated suggestions are integrated into their writing. The findings aim to inform pedagogical strategies for leveraging AI to foster cohesive, coherent, and critically produced academic writing.

Method

This research employed a case study design to investigate the types of AI tools used to generate cohesion in final project essays. The participants were undergraduate students in English Education from the English Department at a university in Indonesia. These pre-service teachers were in their final semester and enrolled in Argumentative Writing Class A, conducted from January to May 2023. To ensure confidentiality, participants were anonymized as T3.PT1, T4.PT2, T2.PT3, T5.PT4, and T1.PT5. Participation was voluntary, did not affect their academic performance or grades, and informed consent was obtained from all individuals involved.

The primary instruments used for data collection were documentation, observation, and a questionnaire. Documentation involved collecting students' final project essays, with a specific focus on their introductory paragraphs. Observation was carried out to review the students' writing processes and their interactions with AI tools throughout the course. In addition, a closed-ended Likert-scale questionnaire was distributed via Google Forms to gather insights into students' experiences and perceptions of using AI in their writing practices.

Data analysis was conducted in two phases. In the first phase, textual analysis was employed using Halliday and Hasan's (1976) cohesion framework. This framework includes five types of cohesion devices: reference, substitution, ellipsis, conjunction, and lexical cohesion. The analysis focused on identifying and categorizing the cohesion devices used in students' introductory paragraphs. In the second phase, thematic analysis was conducted to interpret students' responses from the questionnaire and observational notes. This qualitative approach aimed to uncover recurring patterns, themes, and underlying meanings. The researchers ensured that emerging themes were not merely descriptive but represented deeper insights into the participants' perspectives and engagement with AI tools during the writing process.

Results and Discussion

This section presents the findings on how pre-service teachers engage with AI writing tools to enhance cohesion in their preparatory paragraphs. The analysis first identifies the AI platforms they employ and the specific ways these tools are integrated into their writing process. It then examines the types of cohesion devices—such as conjunctions, reference words, and lexical links—used in the preparatory paragraphs, highlighting patterns and preferences. Finally, the discussion explores both the technical strategies (e.g., tool selection, prompt formulation) technical and cognitive strategies (e.g., critical evaluation, idea refinement, and adaptation of AI-generated suggestions) that guide students' interaction with AI. These insights provide a basis for understanding the interplay between digital support and the development of cohesive academic writing skills.

AI Writing Tools and How They Use

RQ1 = What is the name, and how do you use those AI to create cohesion devices in the preparatory paragraph of your essay?

> *"I used ChatGPT, Grammarly, and Quillbot to create cohesion devices in the introductory paragraph of my essay. Grammarly to check fluency and cohesion, especially in the use of conjunctions and reference words. Quillbot helps writers ensure lexical operations so that cohesion does not feel monotonous. ChatGPT helps provide suggestions for transitions within paragraphs, improving writing and recommendations for using appropriate cohesion devices." (reflection, 08/04/2025, PT1, Female).*

PT2's assertion also supports it:

> *"The first is ChatGPT, and the second is Quillbot, or sometimes I use deep learning. I use it to help generate cohesion devices during the preparation of making it easy." (reflection, 08/04/2025, PT2, Male).*

The data show that ChatGPT, QuillBot, Grammarly, and DeepL Translator are the most frequently used AI writing tools among pre-service teachers. ChatGPT was primarily employed to generate transitional phrases and suggest cohesion devices; Grammarly was used to check fluency and cohesion, particularly in conjunctions and reference words; QuillBot supported lexical variation to prevent monotonous cohesion; and DeepL provided translation assistance, especially for multilingual phrasing.

Compared to global trends—where a broader spectrum of AI platforms such as Jasper, Writesonic, Perplexity, and Wordtune are increasingly adopted (Adauto Medina et al., 2024; Alamri et al., 2025) - this narrower selection suggests a strong reliance on highly recognizable, accessible, and user-friendly tools. Several factors appear to drive these choices: (1) cost and access, as ChatGPT and Grammarly offer free versions, while QuillBot and DeepL are partially free; (2) ease of use, since these platforms require minimal orientation; and (3) multilingual capabilities, which are particularly valued in diverse language learning environments.

This limited tool diversity has implications for cohesion development. While the chosen platforms effectively support basic cohesion—through transitions, reference devices, and lexical variety—their algorithms may reinforce predictable and formulaic linking patterns. Without exposure to a wider range of AI tools offering different stylistic models, students may have fewer opportunities to experiment with varied cohesive strategies. This finding aligns with previous research showing that over-reliance on a small set of tools can narrow students' linguistic range in academic writing (Hammad, 2023; Livberber & Ayvaz, 2023).

Types of cohesion devices

> *RQ2 = What types of cohesion devices are commonly found in pre-service teachers' preparatory paragraphs of essays?*

Table 1 Distribution of Cohesion Types

Text	Reiteration	Conjunction	Reference
Text 1	5	3	3
Text 2	6	3	3
Text 3	8	3	3
Text 4	7	3	3
Text 5	7	3	4
Total	33	15	16
%	51,56	23,44	25

Textual analysis revealed that the most frequently used cohesion devices in pre-service teachers' preparatory paragraphs were reference, repetition, lexical cohesion, and conjunction. References were often employed to maintain continuity of the subject, while repetition was used to reinforce key terms and concepts. Lexical cohesion appeared through the use of synonyms and semantically related words, though less frequently than reference and repetition. Conjunctions served to signal logical relationships between ideas, with "and," "but," and "because" appearing most often. These patterns indicate that students tend to rely on a narrow range of familiar cohesion strategies. In line with Halliday and Hasan's framework (Setiawan, 2021), such devices are essential for creating interdependence between sentences and ensuring overall textual clarity; however, the overuse of repetition and limited

variety of lexical links suggest that cohesion in many paragraphs remains formulaic rather than varied and nuanced. Table 1 shows that there are 64 cohesions, including reiteration, conjunction, and reference. Reiteration is a part of the lexical cohesion, meanwhile reference and conjunction are of grammatical ones. Lexical cohesion is a linguistic tool that fosters coherence by establishing meaningful connections between words and concepts through the use of vocabulary (Allagbé et al., 2021). Meanwhile grammatical cohesion is a cohesion mechanism that employs grammatical elements to establish the meaning connections within a text. It encompasses two key components: conjunction, and reference (Jam et al., 2023).

Reiteration

Reiteration is the dominant cohesion device used (51.56. %). It involves repeating the same or similar words to connect ideas. This technique encompasses repetition, synonyms, superordinate, and general words, all establishing semantic links by employing identical or related vocabulary (No, 2021).

Table 2 Reiteration in Student' Essays

Text
Transportation is predicted to be one of the main *contributors* to the increase in geothermal effects.
This is largely *caused* by the extensive use of fossil fuels, which emit carbon dioxide during *stion*.
To address this issue, the development of *electric vehicles* (EVs) has gained momentum as a tial *solution* to combat climate change.
Unlike vehicles powered by petroleum fuels, EVs do not produce *harmful emissions* during use.
In fact, electric vehicle *battery waste* is difficult to recycle.
While EVs may seem like a *promising solution*, their use contributes to environmental problems than providing solutions.

Note: the sample of reiteration was taken from PT5T1

From Table 2, lexical cohesion can be observed in both synonymous terms and related vocabulary, such as "contribute" and "cause", "combustion" and "use", as well as "potential solution" and "promising solution". These lexical choices enhance the text's coherence and readability.

Lexical cohesion is also established through exact repetition, where several key terms are repeated to emphasize their significance. For instance, "transportation" is repeated to highlight its role in contributing to the increase in geothermal effects. "Fossil fuels" appear twice to underline their major impact on environmental problems. The term "electric vehicles (EVs)" is used repeatedly to introduce and contrast their characteristics with conventional vehicles. Similarly, "harmful emissions" is repeated to stress the environmental impact differences between EVs and fossil fuel-powered vehicles. Lastly, "promising solution" is reiterated to first present EVs as a hopeful response to ecological concerns, and then to challenge that perception.

Conjunction

The use of conjunctions appeared in third position with a percentage of 23,44%, a slight difference compared to the use of reference words. Conjunctions serve as linguistic tools that establish cohesive semantic relations, specifying how subsequent information is systematically linked to preceding information. Four main categories of conjunctions exist: additive, adversative, temporal, and causal

Table 3 Conjunction

Conjunction Type	Examples	Text	Function
Additive	- AI can support teachers… *and* help them do a better job. - AI can *also* teach students skills or reinforce difficult concepts…	Text 2	Adds supplementary or equal information to an existing point.
	- *In addition*, effective waste management…	Text 3	
Adversative	- *While* AI has the potential to revolutionize many industries… it is unlikely to replace human teachers…	Text 2	Signals contrast or an opposing viewpoint.
	- *However*, one aspect that often gets overlooked…	Text 3	
Temporal	- *Since* the outbreak began… - ...protection *during* this pandemic.	Text 3	Indicates time relationships between events or ideas.
Causal	- *Doing so* would not only exacerbate tech dependence…	Text 2	Expresses cause–effect or consequence.

Note: The sample of conjunctions was taken from (PT1T3 & PT3T2)

Reference

Reference appeared in the second position, with 25% used by pre-service teachers. Reference, one of the key components of grammatical cohesion, is categorized into three types: personal pronouns, demonstrative pronouns, and comparative pronouns.

Table 4 Reference

Reference Type	Example	Text	Function
Personal Pronoun	- Individuals acquire knowledge, develop skills, and grow in *their* understanding of…	Text 4	Shows ownership or personal involvement, linking subject and object to keep the text cohesive.
	- …we have all learned about the importance of protecting *ourselves* from…	Text 3	
Demonstrative Pronoun	- *This* can potentially impact human workforce displacement…	Text 5	Refers back to an idea/thing mentioned earlier to avoid repetition and maintain logical flow.
	- *This* is largely caused by the extensive use of fossil fuels,…	Text 1	
Comparative Pronoun	- Thus, a teacher's quality is *the most* important factor in …	Text 4	Indicates comparison or degree (more, most, unlike) between items to
	- *Unlike* vehicles powered by petroleum fuels…	Text 1	

-	AI can support … and help … a *better* job.	Text 2	show similarity or difference.

Note: The samples o f reference were taken from PT2T4, PT1T3, PT4T5, PT5T1, & PT3T2

Technical and Cognitive Strategies in using AI

Pre-service teachers demonstrated a combination of technical strategies—such as targeted prompting, selective acceptance of AI suggestions, and iterative revisions—and cognitive strategies, including critical evaluation, idea filtering, and adapting AI-generated outputs to fit rhetorical and contextual needs.

Adaptation of AI Suggestions

RQ3= How do you align the cohesive devices suggested by AI with the introductory paragraph of your essay both technically and cognitively?

> *"I don't just copy the suggestions directly. I usually read them first, then I adjust the words based on the context of my paragraph. Sometimes I change the position of the device or modify the sentence, so it sounds more natural and matches my writing style." (reflection, 14/04/2025, PT3, Female).*

The finding shows that Pre-service Teacher (PT3) not only use AI, but they also use their critical thinking skills. Critical thinking encourages curiosity and continuous learning, avoids fabrication and hoaxes, and allows us to analyze problems more sharply and find effective solutions. Critical thinking is one of the skills that is crucial to an individual's career success (Ellerton et al., 2024; Leibovitch et al., 2025).

> *"I don't just copy the suggestions directly. I usually read them first…." (reflection, 14/04/2025, PT3, Female)*

Prompt Design and Purpose Alignment

> *"What are good transition words to connect these ideas in an academic essay?" (reflection, 07/04/2025, PT4, female)*

Based on the findings, the prompt design should be detailed. We don't need to go around correcting or re-querying. Once the user gives a prompt, the user can immediately get an answer that is close to what the user wants. The use of detailed design prompts will produce more precise results and streamline time (Gupta & Shivers-McNair, 2024).

It seems reasonable to argue that PT3 not only uses AI, but they must also criticize in thinking. In critical thinking, there are brainstorming process that can be creative and open-minded, because it is the process of generating a wide range of ideas, helping people to explore all possible solutions (Prominski & Tian, 2020; Wang & Wang, 2025).

> *"Then, I adjust the words based on the context of my paragraph." (reflection, 14/04/2025, PT3, Female).*

It seems to make sense with the PT3 argument, because with students asking about what cohesion devices are suitable, they need the ability to formulate structured questions and choose the cohesion devices ideas selected from the AI to write quality essays (Karadağ & Ozar, 2025; Mei et al., 2025).

> *"Sometimes I change the position of the device or modify the sentence, so it sounds more natural and matches my own writing style." (reflection, 14/04/2025, PT3, Female).*

It seems to make sense with PT3 argument, by making appropriate, it indicates that one does not just blindly choose, but thinks logically, considers the context, and evaluates the options before deciding (Cumming, 2020; Michel et al., 2025a). The appropriate choice is choosing and adapting ideas to fit your writing in the best way. This indicates the ripeness of thinking and the aptitude to filter information.

Final Decision Making

> *"I assess the decisions generated by the AI, then I choose the best ones that suit my purpose and writing style." (reflection, 11/04/2025, PT5, female)*

Based on the findings, apparently, with PT5's assertion that in the final decision-making process, we should think about the alignment between the essay and the prompt design of AI. The AI platform probably gives you a handful of sentence paths, but without alignment, you risk being left with something that sounds good but fails to hit the mark.

> *"…and edit to personalize them." (reflection, 11/04/2025, PT5, female)*

From the findings above, it can be concluded that in the final decision-making process after using AI, we should humanize the language because readers are capable of discerning between writing that is "copy-pasted from AI" and what humans genuinely think and speak. Humanized language feels more genuine, evocative, and biblical.

> *"I also compared different versions to see which one had a smoother flow and clearer logic." (reflection, 11/04/2025, PT5, female)*

Apparently, with PT5's assertion, by realistic flowchart, timesaving and efficiency-enhancing in essay writing. Final decision making necessitates a realistic flowchart because it helps the writer make decisions that are purposeful, logical, efficient, and in line with the paper's needs.

Discussion

Pre-service teachers predominantly use ChatGPT, Grammarly, Quillbot, and DeepL to enhance cohesion in their introductory paragraphs. Each platform offers distinct advantages: ChatGPT supports the logical tone and structure of academic writing (Muthmainnah et al, (2025)), Quillbot helps with lexical variation to avoid monotony, Grammarly aids in improving fluency and grammatical cohesion, and DeepL provides refined translations with smoother transitions. These results align with the shift in ELT towards integrating digital tools that foster clarity and coherence in student writing (Allagbé et al., 2021; Michel et al., 2025b).

According to Halliday and Hasan in Setiawan, (2021) cohesion in writing is achieved through grammatical and lexical means. Grammatical cohesion includes reference, substitution, ellipsis, and conjunctions, while lexical cohesion comprises repetition and synonym. The data in this study revealed that the most frequently used forms of grammatical cohesion were conjunctions and reference devices, specifically personal, demonstrative, and comparative references. Lexical cohesion was primarily achieved through repetition and the use of semantically related vocabulary.

Repetition, or exact reiteration, was the most common form of lexical cohesion. As Halliday and Hasan noted, repetition enhances clarity, emphasizes key points, and reinforces conceptual links. While it serves to improve readability, overuse may reflect limited lexical variation. Thus, tools like Quillbot play a critical role in introducing synonymy, offering students a broader lexical palette to maintain cohesion without redundancy.

Grammatical cohesion, particularly conjunctions, was also prominent. As described by Mandarani (2020) and No (2021) Additive (e.g., "and," "also"), adversative (e.g., "but," "however"), temporal (e.g., "then," "after"), and causal conjunctions (e.g., "because," "so") serve different rhetorical purposes that link ideas effectively. Similarly, reference mechanisms—such as personal pronouns, possessive determiners, and demonstrative indicators—were utilized to maintain consistency and avoid repetition.

In addition, the study also examined how students adapted AI-generated suggestions. Three cognitive strategies emerged: critical thinking, prompt design, and final decision-making. Critical thinking is manifested through brainstorming, structured questioning, and selecting appropriate AI suggestions (Cumming, 2020; Ellerton et al., 2024). These strategies demonstrate students' awareness of aligning AI input with their writing goals.

In line with the strategies employed by the students, prompt design significantly influenced the quality of AI feedback. Effective prompts were detailed, clear, and logically structured—allowing for more targeted suggestions (Kasirzadeh & Gabriel, 2023). This aligns with the growing recognition that prompt engineering is a vital skill in AI-assisted learning.

Taken together, these findings indicate that while AI tools assist in generating cohesive writing, the students' agency in navigating, adapting, and evaluating AI feedback is essential. The discussion reinforces the importance of AI literacy, which includes not only technical use of tools but also the metacognitive strategies needed to produce academically appropriate and coherent texts. Therefore, writing instruction should incorporate guided use of AI alongside explicit teaching of cohesion principles and critical thinking strategies to foster deeper learning outcomes.

Conclusion

The study's findings emphasize three key areas: the types of AI tools used, the cohesion devices commonly suggested by these tools, and the cognitive strategies pre-service teachers use to meaningfully integrate AI-generated suggestions. First, ChatGPT, Grammarly, Quillbot, and DeepL Translator stand out as the highest-used AI platforms. However, despite the widespread uptake of these tools, this study also divulged those teachers who lacked adequate training and support often experienced marginal access to larger AI platforms — that is, their access was constrained by limited technological infrastructure, insufficient digital literacy, and restricted user permissions. Second, this study revealed that AI tools chiefly suggest three types of cohesion devices: reference, lexical repetition, and conjunction. Thirdly, and perhaps most importantly, this study reveals how pre-service teachers cognitively process AI suggestions, which are conceptualized into three themes: Critical Thinking, Proper Goal Design and Alignment, and Final Decision Making. While AI tools help pre-service teachers boost cohesion in academic writing, the deeper significance lies in how they use these tools with critical awareness. This study revealed an expanded ability to apply AI thoughtfully and strategically, rather than

blindly relying on AI. These findings hint at the need to integrate AI literacy into teacher education programs, prepping future educators to use such technologies responsibly and creatively to support student writing.

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