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PERPLEXITY AI IN ENHANCING EFL STUDENTS' ACADEMIC WRITING: A SYSTEMATIC LITERATURE REVIEW

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Abstract

This study aims to explore the role of Perplexity AI in enhancing EFL students' academic writing through a Systematic Literature Review (SLR). Using the PRISMA framework, this review synthesized 25 peer-reviewed studies published between 2020 and 2025 retrieved from the Scopus, ERIC, and Google Scholar databases. The inclusion criteria focused on empirical and review studies discussing AI-assisted academic writing in higher education EFL contexts, while non-peer-reviewed and unrelated studies were excluded. The data were analyzed through thematic synthesis to identify key pedagogical benefits, challenges, and institutional implications of Perplexity AI in academic writing instruction. The findings reveal that Perplexity AI contributes positively to writing coherence, text organization, academic vocabulary development, learner autonomy, and writing efficiency. However, challenges such as over-reliance on AI, plagiarism concerns, and the potential decline of critical thinking skills were also identified. The review further emphasizes the importance of AI literacy, ethical guidelines, and pedagogically guided practices in AI-assisted writing instruction. Overall, Perplexity AI demonstrates strong potential as a supportive academic writing tool when implemented critically, responsibly, and within structured educational frameworks.

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INTRODUCTION

Academic writing is widely recognized as a fundamental component of English as a Foreign Language (EFL) learning in higher education. Beyond linguistic proficiency, academic writing requires students to develop critical thinking, organize ideas coherently, construct logical arguments, and integrate academic sources appropriately in scholarly communication. However, many EFL students continue to experience difficulties in producing academic texts that meet academic standards, particularly in terms of coherence, academic vocabulary, argument development, and source integration (Leki, 2001; Jones, 2007). These challenges often affect students' ability to communicate ideas effectively and reduce their confidence in academic writing activities. In addition, lecturers frequently encounter difficulties in providing intensive and individualized writing feedback because of limited instructional time and large classroom contexts. Consequently, improving the quality of EFL students' academic writing has become an important concern in higher education, particularly in technology-supported learning environments where digital tools increasingly influence academic literacy practices.

In response to these challenges, the rapid advancement of Artificial Intelligence (AI) has significantly transformed academic writing practices in higher education. AI-powered tools are

increasingly utilized to support idea development, drafting, paraphrasing, feedback generation, and writing revision processes (Almashy *et al.*, 2024). The integration of AI in academic writing is considered beneficial because it may improve writing efficiency, accelerate revision processes, and provide immediate language support for learners. Among emerging AI platforms, Perplexity AI has attracted growing academic attention because it combines generative AI capabilities with retrieval-based information systems and source-linked responses. Unlike conventional generative AI tools such as ChatGPT, which primarily emphasize text generation, Perplexity AI provides citation-supported outputs and direct access to verifiable academic information, thereby offering greater source transparency, information traceability, and research-oriented support in academic writing contexts (Khine, Bognár and Afari, 2025). Consequently, Perplexity AI functions not only as a writing assistant but also as a research-support tool that may strengthen academic rigor and reduce the risk of unverifiable information in EFL academic writing contexts. As AI-assisted learning continues to expand in higher education, understanding how platforms such as Perplexity AI support academic writing has become increasingly important for ensuring effective, ethical, and research-oriented writing practices among EFL learners.

Despite the growing integration of AI in academic writing instruction, existing studies have predominantly focused on general generative AI tools, particularly ChatGPT, while research specifically examining Perplexity AI remains limited (Luo and Hsiao-Chin, 2023; Wu, 2024). Previous studies mainly discuss AI-assisted writing in broad contexts without systematically examining the pedagogical benefits, challenges, and institutional implications associated with Perplexity AI in EFL academic writing. Furthermore, limited attention has been given to how Perplexity AI supports writing coherence, textual organization, academic vocabulary development, and source-based academic writing practices in higher education EFL contexts, especially in developing countries such as Indonesia (Zafar, 2016; Fadhly, 2022; Almashy *et al.*, 2024; Esperanzate, 2025). Existing studies also tend to emphasize general AI adoption rather than focusing on the distinctive retrieval-based and citation-supported features offered by Perplexity AI. These conditions indicate that the specific pedagogical contribution of Perplexity AI in supporting academic writing development remains underexplored in the literature. To date, no comprehensive systematic review has specifically synthesized the pedagogical contributions, challenges, and institutional implications of Perplexity AI in EFL academic writing contexts. These gaps highlight the need for a more focused and systematic examination of Perplexity AI within AI-assisted academic writing research (Riveira *et al.*, 2024).

Accordingly, this study aims to systematically examine the role of Perplexity AI in enhancing EFL students' academic writing through a Systematic Literature Review (SLR). This study specifically investigates the pedagogical benefits, challenges, and institutional implications associated with the integration of Perplexity AI in academic writing instruction. The review focuses on studies discussing the use of Perplexity AI in higher education EFL contexts, particularly in relation to writing coherence, textual organization, academic vocabulary development, source integration, learner autonomy, and research-oriented writing practices. At the same time, this study also examines several critical concerns associated with AI-assisted writing, including overreliance on AI-generated content, plagiarism risks, ethical issues related to academic integrity, and the potential decline of students' critical thinking abilities (Strobl *et al.*, 2019; Benites, 2023). The scope of this review is limited to studies examining Perplexity AI within academic writing contexts in EFL higher education settings and does not include AI applications in non-academic writing or non-EFL educational contexts. By synthesizing existing literature, the study contributes to the theoretical development of AI-assisted writing pedagogy and offers practical recommendations regarding ethical AI integration, AI literacy development, and academic integrity in EFL higher education contexts.

RESEARCH METHOD

This study employed a Systematic Literature Review (SLR) approach to examine the role of Perplexity AI in enhancing EFL students' academic writing skills. The SLR approach was selected because it enables researchers to systematically identify, evaluate, and synthesize relevant studies related to a specific research topic in a transparent, structured, and rigorous manner (Sauer and Seuring, 2023; Marzi *et al.*, 2025). Through this approach, the study aimed to obtain a comprehensive understanding of the pedagogical benefits, challenges, and institutional implications associated with the integration of Perplexity AI and other AI-assisted writing technologies in EFL higher education contexts. The study adopted thematic synthesis to identify and interpret recurring patterns and themes reported across previous studies.

Research Design

This study applied a Systematic Literature Review (SLR) design focusing on thematic synthesis of previous studies discussing the use of Artificial Intelligence (AI) in EFL academic writing. The review primarily examined studies related to AI-assisted writing tools, particularly Perplexity AI, ChatGPT, and other generative AI platforms used in higher education writing instruction. Particular attention was given to how these technologies contribute to writing coherence, textual organization, academic vocabulary development, learner autonomy, writing efficiency, and source-based academic writing practices within EFL higher education settings. The review process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Page and Moher, 2017), which consists of four stages: identification, screening, eligibility assessment, and final inclusion of studies.

The data collection process was conducted through several academic databases, including Scopus, ERIC, and Google Scholar. The literature search focused on peer-reviewed journal articles published between 2020 and 2026 to ensure the relevance and recency of studies discussing AI-assisted writing technologies. Several keywords and Boolean search strings were employed during the search process, including "Perplexity AI and academic writing," "AI-assisted writing in EFL," "generative AI and academic writing," and "ChatGPT in EFL writing instruction." During the identification stage, relevant studies were collected based on titles, abstracts, and keywords. In the screening stage, duplicated and unrelated studies were removed. Subsequently, full-text evaluation was conducted during the eligibility stage to determine whether each study fulfilled the established inclusion and exclusion criteria. The inclusion criteria focused on empirical and review studies discussing AI-assisted academic writing within EFL higher education contexts. Meanwhile, studies unrelated to academic writing, non-EFL educational settings, non-peer-reviewed publications, conference proceedings, and inaccessible full-text articles were excluded from the review process. Following the PRISMA selection procedure, a total of 25 studies were finally selected and synthesized in this review.

The collected data were analyzed using thematic synthesis to identify recurring patterns, themes, and pedagogical implications related to the integration of Perplexity AI and other AI-assisted writing technologies in EFL writing instruction. The thematic analysis process consisted of several stages. First, all selected studies were read repeatedly to achieve data familiarization and develop a comprehensive understanding of the findings presented in each study. Second, important information related to pedagogical benefits, writing challenges, ethical concerns, learner autonomy, and academic writing development was systematically coded. Third, similar codes were grouped into broader thematic categories based on conceptual similarities identified across the reviewed studies. Finally, the themes were reviewed, interpreted, and synthesized to generate a comprehensive understanding of the role of Perplexity AI in supporting EFL students' academic writing development. The findings were subsequently organized into several major themes, including writing improvement, research-

oriented writing support, learner autonomy, ethical concerns, and institutional implications associated with AI integration in higher education contexts.

RESEARCH FINDINGS AND DISCUSSION

Research Findings

The reviewed studies demonstrate an increasing scholarly interest in the integration of Perplexity AI within EFL higher education contexts, although the existing body of literature remains relatively limited and fragmented. Based on the 25 studies synthesized in this review, Perplexity AI is increasingly recognized as an AI-assisted platform that combines generative artificial intelligence with retrieval-based information systems and citation-supported outputs. This integrated architecture differentiates Perplexity AI from conventional generative AI technologies because it not only facilitates text generation but also provides access to verifiable academic references and research-based information. Across the reviewed studies, Perplexity AI is consistently associated with improvements in writing efficiency, idea generation, textual organization, academic vocabulary development, coherence, and learner autonomy among EFL students.

The findings further reveal that Perplexity AI contributes positively to process-oriented academic writing practices in higher education environments. The reviewed studies indicate that the platform supports learners throughout multiple stages of academic writing, including brainstorming, outlining, drafting, revising, and academic source exploration. In addition, the availability of citation-supported responses encourages students to engage more actively with scholarly references and evidence-based information during the writing process. Nevertheless, the literature also identifies several recurring concerns regarding the use of AI-assisted writing technologies, particularly over-reliance on AI-generated content, plagiarism risks, superficial engagement with information, and ethical concerns related to academic integrity. These findings suggest that although Perplexity AI offers considerable pedagogical potential, its implementation requires appropriate instructional supervision, AI literacy development, and ethical regulation within higher education contexts.

Table 1. Synthesized Themes of Perplexity AI in EFL Academic Writing.

No	Area or Focus	Author (Year	Insight atau Variabel riset
1	Utilization and Overall Impact of Perplexity AI in Academic Writing	(Nurjanah, 2025; Shabir, 2025)	Perplexity AI improves writing efficiency, accelerates idea development, and supports drafting processes in EFL academic writing. Students report faster completion of writing tasks and better organization of ideas.
2	Contribution to Academic Writing Components	(Mikraj, Wijaya and Salainti, 2024)	Perplexity AI contributes to coherence, academic vocabulary enrichment, and clearer text organization. AI-generated suggestions help students maintain logical flow in academic paragraphs.
3	Pedagogical Funcions Across the Writing Proces	(Şen, 2025; Stojković and Wang, 2025)	Perplexity AI functions as a scaffolding tool during brainstorming, outlining, drafting, and revising stages. It supports process-oriented academic writing instruction.
4	Challenges, Comparative Perspectives, and Institutional Implications	(Anwar and Murtadho, 2023)	Risks include over-reliance on AI, plagiarism concerns, inaccurate citations, and limited critical thinking engagement. AI literacy and institutional policies are necessary for responsible use.

Discussion

1. Utilization and Overall Impact of Perplexity AI in Academic Writing

The utilization of Perplexity AI in English as a Foreign Language (EFL) academic writing contexts reflects a growing transformation in the way learners engage with writing as both a cognitive and research-based process (Cabrera and Cabrera, 2023). Across the synthesized studies, Perplexity AI is consistently reported as being integrated into multiple stages of academic writing, including topic exploration, literature search, idea generation, argument construction, paraphrasing support, drafting, and revision. This multifunctional usage indicates that the tool operates not merely as a linguistic aid, but as a hybrid system that combines generative artificial intelligence with retrieval-augmented information access (Genesis, 2025). Unlike conventional writing assistance tools that primarily focus on grammar correction or sentence-level improvement, Perplexity AI enables users to interact directly with structured academic information supported by source-linked outputs. In this regard, it functions as an epistemic scaffold that assists learners in navigating academic knowledge, synthesizing information from multiple references, and constructing more evidence-based academic texts (Lin and Puntambekar, 2025). Consequently, its utilization reflects a shift from product-oriented writing support toward process-oriented and research-integrated writing practices in EFL academic contexts.

In terms of overall impact, the literature demonstrates a generally consistent positive relationship between the use of Perplexity AI and improvements in EFL students' academic writing performance. The reviewed studies indicate that increased frequency of engagement with the tool is associated with enhanced writing fluency, improved coherence and textual organization, expanded academic vocabulary, and greater confidence in completing writing tasks (Taye and Mengesha, 2024; Nurjanah, 2025). These improvements are largely explained by the tool's ability to reduce cognitive load during writing by providing immediate access to summarized information, relevant academic sources, and structured writing guidance. Moreover, Perplexity AI supports learners in developing more organized arguments by offering synthesized perspectives from multiple scholarly sources, thereby facilitating deeper engagement with academic content. However, despite these pedagogical benefits, the literature also highlights several critical challenges that must be carefully considered. The most prominent concern is over-reliance, where students may depend excessively on AI-generated outputs, potentially limiting their development of independent critical thinking and academic writing skills (Zhai, Wibowo and Li, 2024; Karamuk, 2025). In addition, issues related to the accuracy and reliability of AI-generated information, the risk of superficial engagement with content, and potential threats to academic integrity such as uncritical reproduction of AI-generated text are frequently reported. Therefore, the overall impact of Perplexity AI should be understood as both enabling and constraining, requiring balanced pedagogical integration supported by digital literacy, ethical awareness, and structured instructional supervision.

2. Contribution to Academic Writing Components

In addition to enhancing coherence in academic writing, Perplexity AI also demonstrates a substantial contribution to the development of both macro-level textual organization and micro-level lexical sophistication in EFL academic writing contexts (Menoun and Boutata, 2025). At the macro-structural level, the reviewed literature consistently indicates that Perplexity AI assists learners in producing more systematic, organized, and genre-appropriate academic texts by providing structural guidance aligned with conventional academic writing formats. The tool supports students in organizing major sections of academic

papers, including introductions, literature reviews, methodologies, findings, discussions, and conclusions, thereby helping learners understand the rhetorical sequencing and hierarchical organization commonly required in scholarly writing (Rochma, 2025). Such support is particularly significant for EFL students, who frequently encounter difficulties in managing discourse organization, maintaining logical progression, and developing cohesive arguments across extended academic texts. By offering explicit organizational scaffolding, Perplexity AI allows learners to allocate greater cognitive attention to content development, analytical depth, and argument quality rather than becoming constrained by structural uncertainty (Stojković and Wang, 2025). In this sense, the tool functions as a mediating pedagogical resource that bridges learners' limited understanding of academic genres with established disciplinary writing conventions, gradually facilitating the internalization of academic discourse structures.

At the micro-linguistic level, Perplexity AI contributes to the development of academic vocabulary by expanding learners' lexical repertoire through the provision of discipline-specific terminology, formal academic expressions, paraphrased alternatives, and context-sensitive synonym suggestions (Krajka, 2025). This lexical support is particularly valuable within EFL contexts, where students often struggle with limited vocabulary range, repetitive word usage, and insufficient awareness of formal academic register. Through exposure to more sophisticated lexical choices embedded within authentic academic contexts, learners are gradually encouraged to develop greater lexical precision, accuracy, and appropriateness in academic communication. Furthermore, the integration of vocabulary suggestions within meaningful textual environments enables learners not only to understand word meanings, but also to recognize appropriate usage patterns, collocations, and discourse functions, all of which are essential components of effective academic writing (Sadiqzade, 2025). Viewed holistically, the combined contribution of Perplexity AI to textual organization and vocabulary development suggests that the tool operates not merely as a corrective mechanism, but as a developmental scaffold that supports the progressive acquisition of academic writing competence among EFL learners. Nevertheless, the reviewed studies also emphasize that these pedagogical benefits can only be fully optimized when learners engage critically with AI-generated assistance and when instructors provide appropriate pedagogical mediation, ensuring that technological support promotes genuine writing development rather than passive dependence on automated systems (Nicola, 2024; Jomaa, 2025).

3. Pedagogical Funcions Across the Writing Proces

The synthesized literature consistently underscores Perplexity AI as a pedagogically transformative tool that supports EFL academic writing across all stages of the writing process, in alignment with process-oriented writing pedagogy (Şen, 2025; Shabir, 2025). In the pre-writing stage, Perplexity AI functions as a cognitive and epistemic scaffold that facilitates learners' engagement with topic exploration, idea generation, and problem formulation. By enabling access to a wide range of synthesized academic information accompanied by source-linked outputs, the tool assists learners in transitioning from fragmented or surface-level understanding toward more structured and research-informed conceptualization. This function is particularly significant in EFL contexts, where students often encounter difficulties in initiating academic writing due to limited disciplinary knowledge, restricted exposure to academic discourse, and challenges in generating researchable ideas (Ramzan, 2023). Through its retrieval-augmented architecture, Perplexity AI reduces cognitive overload by providing immediate exposure to relevant scholarly materials, which in turn supports learners in constructing preliminary arguments, identifying thematic directions, and developing more

academically grounded writing intentions. Consequently, the tool serves not only as an idea-generating aid but also as a knowledge-mediating system that bridges the gap between learners' prior knowledge and academic expectations in higher education writing tasks (Crichton, 2007).

In the subsequent stages of the writing process comprising outlining, drafting, revision, and referencing Perplexity AI continues to function as a multilayered pedagogical facilitator that supports both linguistic development and metacognitive regulation (Meryem, 2024). During the outlining stage, the tool assists learners in transforming unstructured ideas into coherent academic frameworks by suggesting logical sequencing of arguments, hierarchical organization of content, and alignment with genre-specific conventions such as introduction, literature review, methodology, findings, discussion, and conclusion sections. This scaffolding mechanism helps learners internalize the structural logic of academic genres while reducing cognitive burden associated with organizing extended texts (Reiser, 2004). In the drafting stage, Perplexity AI provides linguistic modeling through academic phraseology, sentence templates, and contextually appropriate expressions that support learners in converting conceptual ideas into formal academic discourse. This contributes to improved fluency, syntactic variety, and rhetorical appropriateness in student writing. During the revision stage, the tool further enhances writing quality by supporting error detection, coherence refinement, and argumentative clarity, thereby promoting iterative cycles of improvement rather than linear writing production. In the referencing stage, Perplexity AI plays a crucial role in strengthening academic integrity by facilitating access to credible sources, summarizing relevant literature, and guiding citation practices in a more structured manner (Kusuma, 2025). Taken together, these pedagogical functions position Perplexity AI as a digital writing mediator that fosters learner autonomy, encourages reflective writing practices, and supports the gradual internalization of academic literacy skills. Nevertheless, the literature also emphasizes that these pedagogical benefits are contingent upon guided instructional integration, as unregulated reliance on AI may undermine critical thinking development and reduce opportunities for independent knowledge construction (Lin, 2026).

4. Challenges, Comparative Perspectives, and Institutional Implications

Despite the growing body of evidence highlighting the pedagogical advantages of Perplexity AI in EFL academic writing, the literature also consistently identifies a range of critical challenges that complicate its pedagogical integration (Esperanzate, 2025). One of the most prominent issues is over-reliance, where learners increasingly depend on AI systems to perform essential cognitive tasks such as idea generation, argument formulation, paraphrasing, and text organization. This dependency has significant implications for the development of independent critical thinking skills, as students may gradually shift from active knowledge construction to passive consumption of AI-generated outputs (Graham and Milan, 2025). In addition, concerns related to academic integrity remain central in the reviewed studies, particularly regarding originality, authorship, and the potential for uncritical incorporation of AI-generated text into academic assignments. The ease of accessing well-structured AI outputs increases the risk of superficial engagement with content, which may result in reduced depth of analysis and weakened academic rigor. Furthermore, technical limitations such as contextual mismatch, variability in source reliability, and limited depth in complex argumentative reasoning further underscore the need for careful evaluation of AI outputs before integration into academic writing (Bahari, 2026). These limitations collectively suggest that while Perplexity AI enhances efficiency and accessibility, it simultaneously introduces epistemic and

pedagogical risks that must be systematically managed through structured instructional design and critical digital literacy development.

From a comparative standpoint, Perplexity AI occupies a distinct position within the broader ecosystem of generative artificial intelligence tools used in academic writing, particularly when contrasted with systems such as ChatGPT (Dwivedi, 2023). ChatGPT is widely recognized for its strengths in generating fluent, coherent, and contextually adaptive text, making it highly effective for brainstorming, drafting, and stylistic refinement. However, its limitation lies in the absence of consistent source attribution, which raises concerns regarding factual verification, academic credibility, and citation accuracy in scholarly writing contexts. In contrast, Perplexity AI is designed as a retrieval-augmented system that prioritizes source transparency and integrates citation-linked responses derived from verifiable academic and web-based sources (Allessandra, 2024). This makes it particularly suitable for research-intensive writing tasks such as literature review synthesis, evidence-based argumentation, and academic source validation. Nevertheless, its relatively constrained capacity for extended creative elaboration and stylistic diversification indicates that it may not fully replace generative models in tasks requiring linguistic creativity and rhetorical flexibility. Consequently, the literature increasingly converges on the view that both tools should be positioned as complementary rather than competing technologies, where ChatGPT supports ideational fluency and linguistic development, while Perplexity AI strengthens epistemic grounding and source-based academic rigor in EFL writing practices (Meryem, 2024).

At the institutional level, the integration of Perplexity AI into academic writing instruction necessitates substantial pedagogical and policy-oriented transformations within higher education contexts (Ruano-Borbalan, 2025). First, there is a clear need to reorient writing instruction toward process-based pedagogical models that emphasize the stages of writing development rather than solely focusing on final written products. This includes incorporating draft-based assessment, iterative feedback cycles, and reflective writing tasks that allow educators to monitor students' engagement with both writing processes and AI tools. Such an approach ensures that learners remain actively involved in critical thinking, decision-making, and revision processes rather than relying uncritically on automated outputs. Second, institutions are required to establish explicit academic integrity frameworks that regulate the ethical use of AI in academic writing, particularly in relation to citation practices, authorship responsibility, and originality standards. These frameworks should provide clear boundaries between acceptable AI-assisted support and inappropriate forms of text generation that compromise academic honesty (Vetter, 2024; Ilie, 2025). Finally, the development of AI literacy among both students and lecturers emerges as a crucial institutional priority, encompassing competencies such as source evaluation, information triangulation, and critical interpretation of AI-generated content. Without these structural and pedagogical safeguards, the integration of Perplexity AI risks becoming inconsistent and potentially counterproductive, thereby undermining both the quality of academic writing instruction and the integrity of scholarly output in EFL higher education (Padró, 2023).

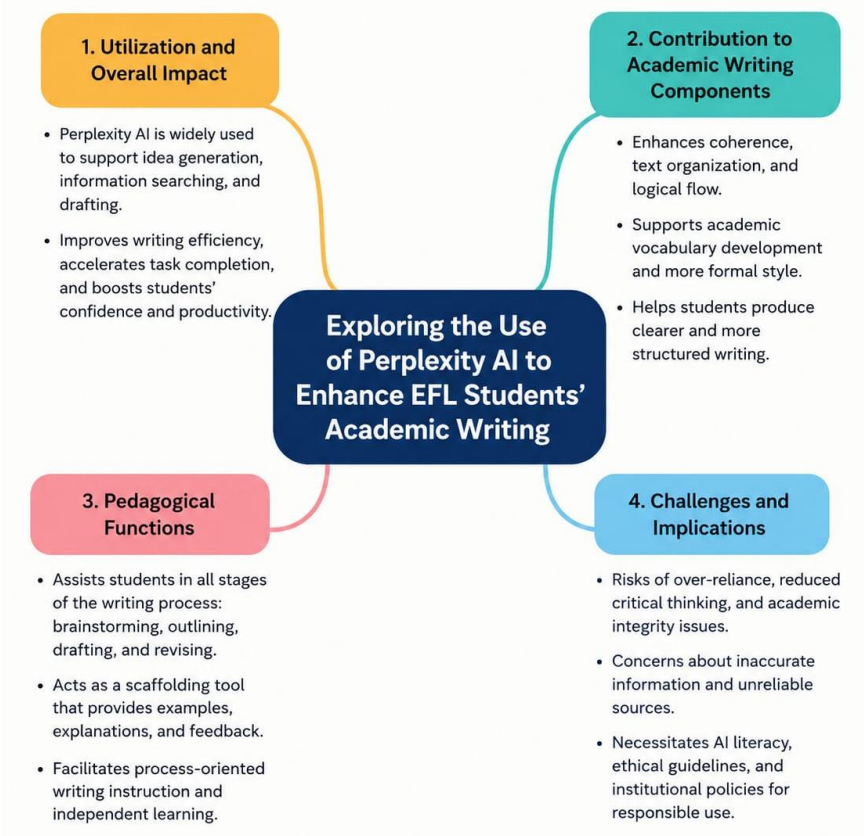


Figure 1. Conceptual Overview of Perplexity AI in Enhancing EFL Students' Academic Writing

Figure 1 illustrates the conceptual relationship between Perplexity AI and the development of EFL students' academic writing skills. The figure demonstrates that Perplexity AI contributes to several dimensions of academic writing development, including idea generation, textual organization, academic vocabulary enrichment, coherence improvement, and learner autonomy. Simultaneously, the figure also highlights several associated challenges, including over-reliance on AI systems, plagiarism risks, and ethical concerns related to academic integrity. Overall, the figure emphasizes that the pedagogical effectiveness of Perplexity AI depends on balanced instructional integration, AI literacy development, and responsible academic use within higher education contexts.

CONCLUSION

Based on the evaluation of synthesized literature on the use of Perplexity AI in EFL academic writing, it can be concluded that this technology has considerable potential to enhance students' writing quality and efficiency, particularly in supporting idea development, textual organization, coherence construction, and academic vocabulary enrichment, as well as facilitating literature searching, outlining, and revision processes that contribute to increased writing productivity and learner autonomy. However, its effectiveness is strongly mediated by students' digital literacy, pedagogical guidance, and institutional policies on academic integrity, while also presenting risks such as over-reliance, reduced critical thinking, and concerns related to originality and authorship in academic writing. Despite these insights, several research gaps remain evident, including the limited number of empirical studies measuring its direct impact on academic writing performance using clear linguistic and structural indicators, the scarcity of longitudinal research addressing long-term effects on writing development and critical thinking, the lack of comparative studies between Perplexity AI and other generative AI tools such as

ChatGPT, and the insufficient evidence from developing country contexts such as Indonesia. Therefore, future research is urgently needed to adopt more empirical, comparative, and longitudinal designs to examine its pedagogical effectiveness, explore its impact on higher-order thinking skills and writing autonomy, and develop evidence-based pedagogical models for its ethical and structured integration into EFL academic writing instruction in higher education.

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