Research Article

INTERDISCIPLINARY
EDUCATIONAL TECHNOLOGY

https://www.interedtech.com

The Paradox of Augmentation and Erosion: Navigating Utility, Critical Agency, and Trust Deficit in AI Writing Tools among Cambodian English Major Undergraduates

Mengkorn Pum [1*]

[1] University of Management and Economics, CAMBODIA
* Correspondence: mengkornpum@gmail.com

CITATION: Pum, M. (2025). The Paradox of Augmentation and Erosion: Navigating Utility, Critical Agency, and Trust Deficit in AI Writing Tools among Cambodian English Major Undergraduates. *Interdisciplinary Educational Technology*, *1*(1), e105.

ARTICLE INFO

Received: 10 November 2025
Accepted: 15 December 2025

OPEN ACCESS

ABSTRACT

This qualitative study aims to investigate the complex experiences, perceptions, and concerns of Cambodian English major undergraduate students regarding the use of Artificial Intelligence (AI) tools (e.g., ChatGPT, Grammarly, and Quillbot) for writing. The study employed thematic analysis on 143 open-ended survey responses. The participants were undergraduate students majoring in English at public and private universities in Cambodia. Four major themes were identified based on the thematic analysis. First, AI as an augmentative tool: Efficiency and skill support highlighted AI's perceived benefits in accelerating drafting, structuring ideas, and improving grammar. In addition, the paradox of dependence: Balancing AI utility with critical agency, revealed users' deep anxiety over the risk of cognitive erosion and their proactive emphasis on the need for critical self-regulation. Furthermore, trust deficit: The challenge of accuracy and contextual failure detailing concerns over factual errors, generic output, and the inability of AI to handle specific local contexts. Finally, practical barriers: Financial, technical, and accessibility limitations—identified cost and unreliable performance as constraints. The findings confirm a paradox of augmentation and erosion, where AI is viewed as an essential tool for efficiency and a threat to intellectual integrity. The research provides scholars with an understanding of how sociocultural, economic, and pedagogical conditions in developing educational contexts actively shape AI adoption among students. This study underscores the urgent need for pedagogical interventions that promote critical digital literacy and self-regulatory strategies, particularly in contexts where practical barriers and trust deficits shape user interaction with generative AI technologies.

Keywords: generative AI, academic writing, cognitive agency, AI trust, AI dependence, undergraduate students

INTRODUCTION

Artificial Intelligence (AI) tools integration has rapidly transformed the landscape of education (Alqahtani et al., 2023; Zawacki-Richter et al., 2019). These technologies increased efficiency, enhanced drafting capabilities, brainstorming, and outlining, and provided support to improve writing (Dwivedi et al., 2023; Pum & Sok, 2024; Sok et al., 2025a; Sok et al., 2025b). However, this swift adoption raised ethical consequences, creating a tension that is still being explored by researchers globally (Mohamed et al., 2025; Pum & Sok, 2024; Sok et al., 2025a). As AI becomes a standard fixture in the student writing process, understanding user experiences—particularly the benefits they leverage and the anxieties they negotiate—is crucial for developing effective digital literacy policies and pedagogical strategies (Al Mahmud, 2023; Kacena et al., 2024; Sok et al., 2025a).

Previous studies have identified the utility of AI in tasks such as idea generation, editing (Pum & Sok, 2024; Sok et al., 2025a), and students demonstrated better academic writing abilities and reported greater assurance in their own writing (Sok et al., 2025b). Such tools are capable of helping students learn languages, facilitating text summarization and language translation, while also aiding in brainstorming ideas (Pum & Sok, 2024; Sok et al., 2025a). However, gaps remain concerning the qualitative experiences of users in non-Western educational contexts. Specifically, few studies have explored the dynamic interplay between the perceived utility of AI and the cognitive and ethical self-regulation required by students (Armitage, 2025; Georgiou, 2025; Kosmyna et al., 2025; Sun et al., 2023). AI's ethical risks, particularly concerning over-reliance can negatively impact human cognition. When users become accustomed to AI-generated solutions, they tend to favor fast, seemingly optimal outputs as cognitive shortcuts, even when they are aware of the ethical concerns involved (Kosmyna et al., 2025; Zhai et al., 2024).

Concerns surrounding AI's potential to foster dependence and reduce critical thinking skills—a phenomenon sometimes termed "cognitive offloading" are increasingly cited, yet direct evidence from student voices remains limited (Costa et al., 2024; Gerlich, 2025; Pereira et al., 2024). Younger individuals were observed to use AI more frequently and, consequently, scored lower on critical thinking assessments compared to older individuals (Gerlich, 2025). Furthermore, earlier studies have not sufficiently examined how trust deficits—particularly concerns about accuracy, contextual relevance, and reliability—manifest differently across socio-economic and technological environments. As a result, more research is needed to capture these practical barriers and context-specific challenges (Zhang & Reusch, 2025). Our research question is "What are the primary experiences, perceptions, and concerns of users regarding the use of AI tools for writing?"

LITERATURE REVIEW

Generative AI in Academic Writing

Generative AI refers to a class of machine-learning models that are trained to create new data that resembles the data they were trained on, instead of simply predicting outcomes based on data (Pulapaka et al., 2024; Zewe, 2023). This tool represents a shift from models focused on classification/prediction to models focused on creation. Generative AI can produce synthetic content that often appears remarkably "real" or human-like because of its powerful architectures (e.g., GANs, diffusion models, transformers) and large-scale training on huge datasets (Alkhalefah et al., 2025; Pulapaka et al., 2024; Zewe, 2023). The advent of large language models (LLMs) such as ChatGPT initiated the generative artificial intelligence (GAI) era. This beginning has been further solidified by the swift subsequent development of improved versions and the expectation of future models like GPT-x (Wang et al., 2024).

The integration of ChatGPT and other generative artificial intelligence (GAI) in education is growing rapidly worldwide. Studies have revealed that generative AI tools, including ChatGPT, provide considerable

advantages, like boosting productivity and offering linguistic assistance to users who are not native English speakers (Costa et al., 2024; van Niekerk et al., 2025). Students viewed ChatGPT as a tool to help them in searching, planning/structuring essays, explaining concepts, and providing definitions (Johnston et al., 2025). It was also found to improve the structure, flow, and conciseness of text, and to help achieve a formal tone (van Niekerk et al., 2025). The adaptation of such a tool is due to speed and interactivity (Johnston et al., 2025). The integration of Generative AI (GenAI) in university academic writing instruction is multifaceted and beneficial, acting as tutors and assistants across the entire writing process. GenAI enhances creativity, fluency, and student confidence while streamlining teaching through personalized feedback and effective Automated Writing Evaluation (AWE) systems (especially in EFL) (Chanpradit, 2025). It offers substantial advantages in education by customizing educational material. Such tools boost student involvement, providing crucial support for non-native language speakers, delivering immediate feedback, and fostering adaptive settings designed to achieve varied learning results (Mohamed et al., 2025; Pum & Sok, 2024; Sok et al., 2025a). A study by Zhao (2025) has found that students who utilized AI tools specifically for language precision (e.g., refining grammar, vocabulary, and sentence structure) demonstrated greater gains in overall writing proficiency than those who used the tools primarily for content summarization or creative writing tasks.

The Cognitive and Ethical Dilemma: Dependence and Critical Agency

Pereira et al. (2024) found that concerns exist regarding the authenticity of AI-assisted work and the potential decline in students' reflective, critical, and creative abilities. The impact of AI on human cognition has been studied recently by Bai et al. (2023) revealed that the over-reliance on AI could weaken people's abilities to think critically and retain information. Humans may delegate thinking tasks to technology—cognitive offloading—which risks diminishing human critical-thinking skills (Nosta, 2025). The phenomenon mirrors the "Google Effect" where search engines influence how we retain, enabling users to avoid the rigorous cognitive processes previously required for complex problem-solving information (Gong & Yang, 2024). Generative AI should be viewed as a supplementary resource that assists with, rather than replaces, creative and critical academic writing (Bakri et al., 2024; Pereira et al., 2024; Smerdon, 2024). Similarly, Bai et al. (2023) and Chanpradit (2025) argued that the use of generative AI must be balanced by careful integration to prevent over-reliance, which threatens critical thinking, authenticity, and academic integrity. Educators must ensure adolescents exert cognitive effort to develop the essential intellectual capabilities needed for success in modern life (Dolan, 2024).

Trust, Accuracy, and Contextual Relevance

Despite the benefits, the integration of ChatGPT in academic writing concurrently introduces serious threats to the honesty and authenticity of academic work, alongside the potential for inaccurate/artificial references as recognized by users (Costa et al., 2024; Johnston et al., 2025; Pereira et al., 2024). The use of AI tools has also raised concerns related to academic integrity, data privacy, algorithmic bias, and ethical use (Islam, 2024; Mohamed et al., 2025). Similarly, another study in Cambodia also identified major issues, including worries about data privacy and security, the danger of over-reliance on AI tools, and the potential for reduced originality in student assignments (Pum & Sok, 2024; Sok et al., 2025a). Four major findings emerged from a study on generative AI's role in the misinformation landscape. The study found that LLMs excel at generating misinformation that is highly persuasive, often by tailoring it to individual users, while the performance of LLM-based detection tools is highly inconsistent, particularly struggling with non-English content and culturally contested topics. The strategies designed to mitigate misinformation are volatile; personalized counter-messaging may fail if it conflicts with user identity, and safety features built into the models are neither stable nor universally effective. Lastly, the misinformation generated by AI has a demonstrable influence on users' attitudes and decisions (Park & Nan, 2025). Islam (2024) argued that the successful adoption of AI tools hinges on overcoming challenges related to data ethics, algorithmic fairness, infrastructure, funding, and faculty expertise.

Access and Equity in AI Use

AI has the potential to democratize opportunities, making education more accessible; however, without deliberate policies and inclusive design, it risks amplifying existing inequalities in access, usage, and outcomes across socioeconomic, gender, and geographic divides. Evidence shows that AI tools can improve writing quality, especially for less skilled writers, narrowing performance gaps (i.e., equity-enhancing diffusion). For instance, in a recent experimental study of generative-AI use for writing tasks, less-skilled participants gained more from AI assistance than their more skilled peers — suggesting that under particular use patterns, AI helps level the playing field (Tukachinsky Forster et al., 2025).

A significant challenge preventing students from adopting such powerful AI tools is the problems and limitations of internet access, the digital divide, and financial constraints (Ahmed, 2024; Johnston et al., 2025). Specifically, developing countries like Cambodia, where internet connectivity is unstable, and the digital divide remains a significant gap between urban and rural areas (Loma Technology, 2025). In education, some obstacles that prevent AI tools from being adopted include technical complexity, inadequate training, limited resources, and large class sizes (Mehdaoui, 2024). The study in Cambodia revealed that university students never received training on using AI effectively, which limits their opportunity to adopt powerful generative AI in supporting their learning (Hoeurng et al., 2024). This lack of training may lead to the misuse of AI in education (Sok & Heng, 2024), further breaking academic integrity (Pum & Sok, 2024). In addition, structural disparities, such as limited digital infrastructure, lack of access to devices or reliable internet, insufficient AI literacy, and sociocultural barriers, continue to restrict AI's benefits to already disadvantaged groups, particularly in under-resourced or rural communities (Hadar Shoval, 2025; Varsik & Vosberg, 2024). Moreover, even when access is provided, inequities may persist depending on who uses AI and how: usage patterns vary significantly across socioeconomic status, interaction styles, and topics of engagement (Bassignana et al., 2025; Bircan & Özbilgin, 2025). Finally, deployment of AI in high-stakes domains or in education can institutionalize biases and reproduce existing structural injustices, meaning that inequality may be amplified rather than alleviated, unless fairness, dataset diversity, and inclusive governance are prioritized (Bircan & Özbilgin, 2025; Bouakaz & Khalid, 2025).

METHOD

Research Design

In this study, we employed a qualitative research design utilizing Thematic Analysis as the primary method to explore and systematically categorize participants' experiences and perceptions of using Artificial Intelligence (AI) tools for writing. This approach was selected as it is highly effective for identifying, analyzing, and reporting patterns (themes) within textual data, allowing for an in-depth understanding of the complex relationship between users and AI in an educational context.

Data Source and Participants

The data for this study consisted of textual responses collected from a survey question focused on user experiences with AI writing tools (e.g., ChatGPT, Grammarly, and Quillbot) for tasks such as drafting, grammar correction, outlining, and idea generation. The primary dataset was derived from an open-ended survey question: *"Do you have any comments about your experience using AI tools for writing? Please share them here."* This approach was chosen to allow participants to freely express their perceptions, concerns, and experiences without constraining their responses. The study was conducted in July 2025, with two weeks duration for participants to respond. The dataset comprised a total of 143 distinct written comments (N = 143). The participants were undergraduate students majoring in English at public and private universities in

Cambodia. The comments reflected personal and academic experiences with AI tools. To ensure validity, the survey was pilot-tested with a small group of students (N= 10) to check for clarity, relevance, and comprehensiveness of the question. The study followed ethical procedures: participation was voluntary, data were collected anonymously, and no identifying information was recorded. In the cover page of the questionnaire, we explained the purpose of the questionnaire and clearly mentioned that by submitting the questionnaire, the participants consented to use the data for research and publication purposes.

Data Analysis Procedure

The data were analyzed using the six-phase framework for Thematic Analysis established by Braun and Clarke (2006). This process involved initial open coding, developing themes, and final reporting.

Phase 1: Familiarization with data

All 143 comments were read and re-read multiple times to immerse in the content, note initial impressions, and gain a holistic understanding of the reported experiences and underlying concerns. The author carefully documented initial observations and reflections in a research journal to ensure systematic engagement with the data.

Phase 2: Generating initial codes (open coding)

The full dataset was systematically analyzed line-by-line. Relevant segments of text (phrases, sentences) that captured a distinct meaning unit were highlighted and assigned a concise, descriptive label (a code). This phase generated a large number of specific codes, such as *"Faster writing," "Risk of cognitive erosion,"* and *"Cost and access limitations."* The author maintained detailed coding notes to track decisions and interpretations throughout the process.

Phase 3: Searching for themes (axial coding)

Related initial codes were grouped and clustered into broader, more abstract categories. This process was guided by the central research question: *What are the perceived benefits, challenges, and user strategies related to the use of AI tools for writing?* Through careful comparison and reflection, the author refined the coding clusters into four preliminary themes:

- Perceived benefits and positive affect
- Accuracy concerns and misinformation risks
- Practical barriers
- Ethical and cognitive concerns

Throughout the analysis, the author maintained a reflective journal to document coding decisions, theme development, and insights. This careful, transparent approach enhanced the credibility and trustworthiness of the findings.

Phase 4: Reviewing and refining themes

The preliminary themes were reviewed against the entire dataset to ensure two criteria were met: internal homogeneity (the codes within a theme were coherent and related) and external heterogeneity (the themes were distinct and separate from each other). Through this iterative refinement, the final four themes were established, and their names were finalized for reporting:

- Theme 1: AI as an augmentative tool: Efficiency and skill support
- Theme 2: The paradox of dependence: Balancing AI utility with critical agency
- Theme 3: Trust deficit: The challenge of accuracy and contextual failure
- Theme 4: Practical barriers: Financial, technical, and accessibility limitations

Table 1. Summary of code frequencies

Themes	Codes/Sub-categories	Total mentions
Theme 1: AI as an augmentative tool (benefits/support)	Faster writing, Idea generation, Grammar and structure support, Increased confidence	57
Theme 2: The paradox of dependence (critical thinking/regulation)	Over-reliance risk, Cognitive erosion, Need for self-monitoring, Balancing AI use	48
Theme 3: Trust deficit (accuracy/context)	Factual errors, Generic responses, Contextual limitations, Reliability concerns	26
Theme 4: Practical barriers (cost/technical)	Cost of AI tools, Limited access, Internet/technical issues	12
Total quotes coded		143

Phase 5: Defining and naming themes

Each of the four final themes was clearly defined, and detailed sub-themes were created to structure the analysis. For example, Theme 4 was broken into the sub-themes of *Risk of Cognitive Erosion* and *Need for Critical Self-Regulation*. This step ensured that the essence of each theme and sub-theme was fully captured and clearly communicated.

Phase 6: Producing the report

The final stage involved linking the identified themes and sub-themes to the full dataset. The results were written, relying heavily on direct quotes from the participants to provide empirical evidence and voice to the thematic claims. To address reliability, the author maintained a detailed audit trail documenting coding decisions, theme development, and reflections on potential biases throughout the analysis. Additionally, codes and emerging themes were revisited and cross-checked against the dataset to ensure consistency and confirm that the themes accurately represented participants' experiences. The frequency of each major theme was counted to provide a sense of its relative prominence within the dataset.

RESULTS

The thematic analysis of 143 user comments revealed a complex, yet consistent, pattern regarding the experience of using Artificial Intelligence (AI) tools for writing. Four major themes were identified, detailing how users leverage AI, the challenges they encounter, the practical barriers they face, and concerns over their own intellectual capacity (see **Table 1** for frequency breakdown).

AI as an Augmentative Tool: Efficiency and Skill Support (n = 57)

The most frequently reported theme focused on the positive functional utility of AI, primarily categorizing it as an enhancement for both the speed and quality of writing.

Efficiency and speed

Participants consistently highlighted the time-saving capability of AI, emphasizing its role in accelerating the drafting process. This utility was particularly valued for large or standardized texts. As participants put it:

> *I would like to share that using AI has helped me write faster, more structured, and more easily generate new ideas*. (P4)

> *It speeds up my writing process immensely*. (P92)

Other participants also highlighted the significant role of AI in writing a long standardized writing task that required precision more faster. The participant mentioned that:

> *It saves me time when I have to write long articles or articles that require clarity and standardization*. (P6)

> *AI is convenient for me when I do not have enough time or when I'm having a time constraint*. (P132)

The participants further emphasized the significance of AI in helping them write more effectively by helping them organize their ideas and structure their text, and check their grammar.

> Using AI for writing helps me save a lot of time and effort in writing and checking the grammar. (P12)

> AI helps me save time and organize my ideas for writing." (P22)

Knowledge and skill support

Users found AI highly effective as a learning and editing assistant, particularly for the mechanical and conceptual aspects of writing. As mentioned by many participants:

> *Using AI tools helps me identify my writing skills and the grammatical errors, so I can improve and develop my writing skills*. (P46)

> *AI helps us get better grammar, and we have many ideas to make our essay more interesting*. (P13)

> *AI helps me understand the structure of writing better*. (P15)

Such AI tools are also found to help users deal with their personal problems by supporting and suggesting good solutions. As some participants share their similar view:

It helps me with my problems. Sometimes I have some personal problems that I cannot talk to others about it, but AI is my first priority. It suggests good choices to me. (P139)

In academia, AI tools have also been found to help users in brainstorming, outlining, structuring, improving grammar, and vocabulary. These benefits were widely viewed by the participants:

> *AI is useful for brainstorming and getting the first draft ready.* (P85)

> *AI helps with my vocabulary and makes my sentences stronger*. (P90)

> *AI is helpful for outlining and structuring a research paper*. (P95)

> *It's a very effective learning tool for structure and clarity*. (P104)

Positive affect

A small cluster of comments expressed strong positive sentiment, highlighting that some students experienced clear benefits and enjoyment from using AI tools for writing. Overall, these quotations suggest that AI can enhance motivation, confidence, and engagement in writing tasks for a subset of users. For example, participants noted that AI made writing easier, enjoyable, and more helpful:

> *It's so good*. (P1)

> *It is very useful and helpful for me*. (P10)

> *It makes writing enjoyable.* (P118)

> *It's so helpful, I love it!* (P141)

While not all participants emphasized positive experiences, these responses indicate that AI tools can provide meaningful affective and functional support for some students.

The Paradox of Dependence: Balancing AI Utility with Critical Agency (n = 48)

Despite the widespread acknowledgment of AI's benefits, a significant body of comments expressed profound anxiety over the cognitive and ethical risks associated with its use. This theme represents the tension between the utility of AI and the preservation of the user's own intellectual capacity and integrity.

Risk of cognitive erosion

Several participants expressed concern that over-reliance on AI tools could negatively impact their own writing abilities and critical thinking skills. While AI can facilitate writing efficiency, students are aware of potential cognitive costs and the risk of reduced self-confidence and independent thinking. As evidence, participants noted:

> *If I use too much AI reduces my thinking skills*. (P3)
>
> *AI helps me write more easily and faster, but at the same time, it makes me lazy in thinking and less confident in myself.* (P11)
>
> *If we use AI too much, it will cause students to be weak in writing and lazy in thinking, causing them to lose their ability to think independently and lack self-confidence*. (P129)

These responses highlight a tension between the efficiency benefits of AI and the students' concern about cognitive erosion, emphasizing the need for self-regulation and critical engagement when using AI tools.

Participants also expressed concerns about the effects of AI on surface-level thinking and memory. Overall, the responses suggest that over-reliance on AI may lead to decreased cognitive effort, weakened memory, and reduced vocabulary retention. Students were aware of these potential drawbacks and articulated feelings of dependence and worry about their thinking skills: As they mentioned:

> *I feel dependent on it now, which is a bit scary*. (P108)
>
> *Overuse of AI is leading to poor thinking skills in my peers*. (P101)
>
> *I worry that using it too much will weaken my memory for vocabulary*. (P115)
>
> *I feel like I'm not thinking hard enough when I use it.* (P142)

These comments highlight the paradox of AI use: while it supports efficiency, excessive reliance may undermine cognitive development, indicating the need for balanced, reflective engagement with AI tools.

Participants also expressed concerns that excessive use of AI tools could diminish their creativity and intrinsic motivation for writing. Overall, these responses suggest that while AI can assist with drafting and idea generation, over-reliance may reduce originality, self-expression, and engagement in the writing process. They mentioned:

> *AI makes people lazy, less creative, and rely too much on the AI system*. (P24)
>
> *I feel I am losing my creativity when I use it too much*. (P71)
>
> *AI is making me lazy and less motivated to write on my own*. (P76)

It helps me write, but I am worried about losing my own voice and creativity. (P82)

These comments highlight that while AI offers practical support, excessive use may hinder creative thinking and reduce students' motivation to engage actively in writing tasks, reinforcing the importance of balanced and reflective use.

Need for critical self-regulation

Participants highlighted the importance of conscious and restrained use of AI tools as a strategy to mitigate potential cognitive and motivational risks. These responses indicate that students are aware of the trade-offs of AI use and emphasize maintaining control over their learning and writing processes. For example, participants remarked:

Using AI is good, but it also has some disadvantages, so we should use it as a bridge. (P2)

Learners should not depend one hundred percent on it. (P8)

However, I find it necessary to self-monitor to ensure that it is appropriate and consistent with the writing intent. (P4)

We should use AI to guide our writing, not to do all of it. (P14)

These comments underscore the proactive strategies students adopt to preserve critical thinking, creativity, and ownership of their work, suggesting that reflective and regulated use of AI can help balance efficiency benefits with cognitive integrity.

Trust Deficit: The Challenge of Accuracy and Contextual Failure (n = 26)

AI outputs were frequently treated with suspicion rather than trust, primarily due to concerns about the information's accuracy, relevance, and overall quality.

Factual errors and inaccuracy

Participants expressed concerns about the reliability and accuracy of AI-generated content. Overall, these responses suggest that while AI can assist with writing and grammar, students often need to verify the information manually and cannot fully rely on the outputs. For example, participants noted:

AI can give you good information and ideas, but sometimes it is wrong, so we have to check the facts carefully." (P16)

AI helps edit grammar, but we're not sure of the output. (P47)

The grammar correction is good, but the factual claims are sometimes dubious. (P94)

AI sometimes uses very complicated language that is hard to simplify. (P106)

The answers are too generic and not specific enough for my assignment. (P110)

It makes writing look professional, but I often find mistakes in the details. (P143)

These comments highlight a trust deficit in AI outputs, particularly regarding factual accuracy, specificity, and contextual relevance, reinforcing the need for critical evaluation and verification by users.

Contextual limitations

Participants expressed concerns about AI's inability to adapt its output to specific local, cultural, or creative contexts, suggesting that while AI can generate structured and grammatically correct text, it often produces

content that is too generic, formal, or misaligned with students' intended style or local relevance. For example, participants noted:

> *Sometimes AI cannot analyze what we want from our context, like Cambodia*. (P9)
>
> *AI doesn't understand the real context and doesn't write in my style*. (P51)
>
> *The output is often too formal or does not fit the informal context I need*. (P88)
>
> *AI can't capture the subtle emotional tone I want in my creative writing*. (P100)
>
> *Sometimes the ideas or contents are too broad for students to understand* (P133)

These comments highlight that AI's lack of contextual awareness can limit its usefulness for assignments requiring cultural specificity, creativity, or nuanced expression, emphasizing the need for user adaptation and critical evaluation.

Practical Barriers: Financial, Technical, and Accessibility Limitations (n = 12)

Finally, a smaller set of comments identified real-world constraints that limited users' access to, and reliable use of, AI tools.

Cost and access limitations

Participants highlighted financial and accessibility barriers as significant constraints to using AI writing tools effectively, suggesting that while premium features often enhance functionality and output quality, many students are unable to afford them, limiting equitable access. For example, participants noted:

> *Most errors or have to pay*. (P5)
>
> *I wish the paid features were free, or at least more affordable*. (P86)
>
> *Paid tools offer better results, but I can't afford them*. (P111)
>
> *The best features are locked behind a subscription*. (P127)

These comments emphasize that cost and subscription models can restrict the practical use of AI tools, creating inequalities in access and highlighting the need for affordable or freely accessible alternatives in educational contexts.

Technical and functional issues

Participants reported that technical and performance problems disrupted their workflow when using AI writing tools, suggesting that connectivity issues, glitches, and inconsistent outputs can hinder the efficiency and reliability of AI-assisted writing. For example, participants noted:

> *Sometimes the server is slow or crashes*. (P78)
>
> *Sometimes they answer incorrectly, sometimes they are slow, sometimes they ask questions and don't give answers*. (P7)
>
> *Connectivity issues often interrupt the flow of writing*. (P103)
>
> *Occasional glitches where it repeats the same sentence*. (P120)

These comments highlight that technical and functional limitations remain a practical barrier to effective AI use, underscoring the importance of stable infrastructure and reliable performance for educational applications.

DISCUSSION

This qualitative study aimed to explore the experiences, perceptions, and concerns of Cambodian English major undergraduates regarding the use of AI tools for writing. We found four significant insights of AI in academic writing, including (a) AI is viewed as an essential tool for efficiency and skill support, (b) a direct threat to intellectual integrity and critical thinking, (c) significant trust deficits, and (d) practical barriers. These findings provide crucial insight into the negotiated use of Generative AI (GenAI) within a non-Western educational context.

The most frequently reported benefits centered on the utility of AI in accelerating and refining the writing process, with the majority of participants valuing AI for enhancing efficiency and speed. The findings are consistent with previous research that highlighted GenAI's role in boosting productivity and aiding linguistic assistance (Costa et al., 2024; van Niekerk et al., 2025). Specifically, we found that students perceived AI tools as beneficial in grammar checking, vocabulary enhancement, and structural outlining, with further improvement in writing. These findings are consistent with a previous study (Dwivedi et al., 2023; Pum & Sok, 2024; Sok et al., 2025a; Sok et al., 2025b; Zhao, 2025). Zhao (2025) noted that utilizing AI for language precision leads to greater gains in overall writing proficiency. We also found that English major undergraduate students view AI functions as a crucial scaffolding tool, helping them manage the technical demands of academic English and achieve clarity and standardization. The finding that participants even sought AI for personal problem-solving underscores its role as an accessible, multifaceted conversational assistant, extending beyond academic tasks.

Despite the strong acknowledgment of AI's utility, the data revealed a deep-seated anxiety over the risk of cognitive erosion (Theme 2). Participants expressed fear that excessive use would lead to laziness, diminished self-confidence, weakened memory, and loss of creativity. This concern directly validates the conceptual risks identified in the literature review, such as cognitive offloading (Gerlich, 2025; Nosta, 2025) and the general decline in critical abilities due to over-reliance (Bai et al., 2023; Hoeurng et al., 2024; Pum & Sok, 2024). The significant finding here is not just the presence of anxiety, but the user's articulated need for critical self-regulation. Students actively expressed a desire to use AI only "as a bridge" or "to guide," demonstrating a proactive intellectual defense mechanism. This self-awareness contradicts a purely passive model of cognitive dependence and underscores the importance of critical agency—a key element missing from many studies—where users are aware of the ethical dilemma and attempt to mitigate the risks themselves.

The reported trust deficit (Theme 3) represents a significant hurdle to effective integration. Concerns over factual errors and the generation of generic, standardized, or complicated output align with existing warnings about the potential for inaccuracy, artificial references, and reduced authenticity (Costa et al., 2024; Pereira et al., 2024; Sok et al., 2025b). Crucially, the data highlights a challenge specific to diverse contexts: AI's inability to address local context, user style, or subtle emotional tone. The explicit statement that "AI cannot analyze what we want from our context, like Cambodia provides empirical evidence supporting the theoretical concerns that AI-generated information struggles with culturally contested and non-English content (Park & Nan, 2025). This contextual failure reinforces the necessity for users to maintain a critical perspective, viewing the tool's output as a draft rather than a final authority.

Finally, the study identified practical barriers (Theme 4) that limit equitable access and consistent utility. Financial constraints, particularly the need to pay for reliable, high-quality features, and recurring technical issues like slow servers and connectivity problems, are consistent with the challenges widely reported in

developing nations (Ahmed, 2024; Loma Technology, 2025). These barriers are particularly concerning in contexts like Cambodia, where students often lack formal training in effective AI use (Hoeurng et al., 2024). This structural disadvantage suggests that the "equity-enhancing diffusion" noted by Tukachinsky Forster et al. (2025) is undermined by economic and infrastructural disparities, reinforcing a digital divide where those who can afford better access benefit disproportionately.

Limitations

This study's findings are based on a qualitative analysis of spontaneous, open-ended survey responses (N=143). While this method provided rich, unfiltered insights into user perceptions, it is subject to several limitations. First, the single-question format may have prioritized salient concerns over a comprehensive overview of daily use. Second, the absence of observed behavioral data means the findings are based on self-reported perception; the actual extent of cognitive offloading or the success of self-regulation remains unmeasured.

CONCLUSION AND FUTURE DIRECTIONS

This study has confirmed the paradox of augmentation and erosion as the central experience of Cambodian English major undergraduates engaging with AI writing tools. While the tools offer undeniable efficiency and linguistic support, their use is negotiated through a profound awareness of the risks to critical agency and intellectual integrity. This negotiation is further complicated by significant trust deficits regarding contextual relevance and real-world practical barriers. This study provides empirical evidence from a Global South context, addressing a major gap in AI-in-education research. It advances understanding of the Cognitive, motivational, and ethical dimensions of student-AI interaction, and the role of sociocultural and technological factors in shaping AI adoption. The findings underscore the urgent need for pedagogical interventions that move beyond simple detection policies. Universities should develop policies and pedagogical interventions that go beyond the simple detection of AI use. Workshops or modules on metacognitive strategies, critical evaluation of AI outputs, and context-sensitive use of AI can help students balance efficiency with intellectual rigor. Educators must focus on promoting critical digital literacy and metacognitive training that actively teaches students *how* to balance AI utility with critical self-regulation—using the tool (e.g., ChatGPT, Grammarly, and Quillbot) as a thought partner rather than a replacement. Future research should employ mixed-methods approaches that combine quantitative measures of writing performance and critical thinking with qualitative data, specifically addressing the actual impact of AI on cognitive load and the effectiveness of user-led self-regulatory strategies.

Author Contributions: MP: Conceptualization, Methodology, Investigation, Formal Analysis, Visualization, Writing -Original Draft, Writing -Review & Editing.

AI Statement: The authors confirm that no generative AI or AI-based tools were used to create the content of this manuscript. All text, analyses, and interpretations were written and verified by the authors.

Ethical Considerations: The study followed ethical procedures: participation was voluntary, data were collected anonymously, and no identifying information was recorded. In the cover page of the questionnaire, we explained the purpose of the study and clearly mentioned that by submitting the questionnaire, the participants consented to use the data for research and publication purposes.

Conflicts of Interest: The authors declare that there are no competing interests.

Funding: The author(s) received no financial support for the research, authorship, and/or publication of this article.

Data Availability: The Data from this study are available from the corresponding author upon reasonable request.

REFERENCES

Ahmed, F. (2024). The digital divide and AI in education: Addressing equity and accessibility. *AI EDIFY Journal*, *1*(2), 12-23. https://researchcorridor.org/index.php/aiej/article/view/259/248

Al Mahmud, F. (2023). Investigating EFL students' writing skills through artificial intelligence: Wordtune application as a tool. *Journal of Language Teaching and Research*, *14*(5), 1395-1404. https://doi.org/10.17507/jltr.1405.28

Alkhalefah, S., AlTuraiki, I., & Altwaijry, N. (2025, March). Advancing diabetic foot ulcer care: AI and generative AI approaches for classification, prediction, segmentation, and detection. *Healthcare*, *13*(6), Article 648. https://doi.org/10.3390/healthcare13060648

Alqahtani, T., Badreldin, H. A., Alrashed, M., Alshaya, A. I., Alghamdi, S. S., Bin Saleh, K., ... & Albekairy, A. M. (2023). The emergent role of artificial intelligence, natural learning processing, and large language models in higher education and research. *Research in Social and Administrative Pharmacy*, *19*(8), 1236-1242. https://doi.org/10.1016/j.sapharm.2023.05.016

Armitage, R. (2025). Your brain on ChatGPT. *British Journal of General Practice*, *75*(758), Article 410. https://doi.org/10.3399/bjgp25X743181

Bai, L., Liu, X., & Su, J. (2023). ChatGPT: The cognitive effects on learning and memory. *Brain-X*, *1*(3), Article e30. https://doi.org/10.1002/brx2.30

Bakri, I., Wulandari, M. F., & Rut, W. M. (2024). QuillBot integration in the learning of English writing skills (Perception of business management students). *International Journal of Research on English Teaching and Applied Linguistics*, *5*(1), 53-58. https://doi.org/10.30863/ijretal.v5i1.6412

Bassignana, E., Cercas Curry, A., & Hovy, D. (2025). The AI gap: How socioeconomic status affects language technology interactions. In W. Che, J. Nabende, E. Shutova, & M. T. Pilehvar (Eds.), Proceedings of the 63rd annual meeting of the association for computational linguistics (pp. 18647–18664). Association for Computational Linguistics. https://doi.org/10.18653/v1/2025.acl-long.914

Bircan, T., & Özbilgin, M. F. (2025). Unmasking inequalities of the code: Disentangling the nexus of AI and inequality. *Technological Forecasting and Social Change*, *211*, Article 123925. https://doi.org/10.1016/j.techfore.2024.123925

Bouakaz, L., & Khalid, D. S. (2025). AI in education: A sociological exploration of technology in learning environments. *Frontiers in Education, 10*, Article 1700876. https://doi.org/10.3389/feduc.2025.1700876

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Chanpradit, T. (2025). Generative artificial intelligence in academic writing in higher education: A systematic review. *Edelweiss Applied Science and Technology*, *9*(4), 889-906. https://doi.org/10.55214/25768484.v9i4.6128

Costa, K., Mfolo, L. N., & Ntsobi, M. P. (2024). Challenges, benefits and recommendations for using generative artificial intelligence in academic writing–a case of ChatGPT. *Medicon Engineering Themes*, *7*(4), 3-38. https://doi.org/10.55162/MCET.07.236

Dolan, E. W. (2024, February 13). *"Catastrophic effects": Can AI turn us into imbeciles? This scientist fears for the worst*. PsyPost - Psychology News. https://www.psypost.org/catastrophic-effects-can-ai-turn-us-into-imbeciles-this-scientists-fears-for-the-worst/

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., ... & Wright, R. (2023). "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, *71*, Article 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642

Georgiou, G. P. (2025). 'ChatGPT produces more "lazy" thinkers: evidence of cognitive engagement decline. *ArXiv Preprint*, Article 2507.00181. https://doi.org/10.48550/arXiv.2507.00181

Gerlich, M. (2025). AI tools in society: Impacts on cognitive offloading and the future of critical thinking. *Societies*, *15*(1), Article 6. https://doi.org/10.3390/soc15010006

Gong, C., & Yang, Y. (2024). Google effects on memory: A meta-analytical review of the media effects of intensive Internet search behavior. *Frontiers in Public Health, 12,* Article 1332030. https://doi.org/10.3389/fpubh.2024.1332030

Hadar Shoval, D. (2025). Artificial intelligence in higher education: Bridging or widening the gap for diverse student populations?. *Education Sciences*, *15*(5), Article 637. https://doi.org/10.3390/educsci15050637

Hoeurng, H., Phorn, P., Kheav, S., & Sam, R. (2024). Integrating artificial intelligence in higher education: A case study of Cambodian universities. *European Journal of Theoretical and Applied Sciences*, *2*(5), 462-473. https://doi.org/10.59324/ejtas.2024.2(5).47

Islam, M.M. (2024). Generative AI: Challenges and opportunities in the higher education sector in Cambodia. In: Lau, E., Paramita, W., Tee, KH., Tan, L.M. (eds) *Economics and Finance Readings. APEF 2023*. Springer, Singapore. https://doi.org/10.1007/978-981-97-3512-9_6

Johnston, H., Eaton, M., Henry, I., Deeley, E. M., & Parsons, B. N. (2025). Discovering how students use generative artificial intelligence tools for academic writing purposes. *Journal of Learning Development in Higher Education*, *34*, 1-28. http://files.eric.ed.gov/fulltext/EJ1464955.pdf

Kacena, M. A., Plotkin, L. I., & Fehrenbacher, J. C. (2024). The use of artificial intelligence in writing scientific review articles. *Current Osteoporosis Reports*, *22*(1), 115-121. https://doi.org/10.1007/s11914-023-00852-0

Kosmyna, N., Hauptmann, E., Yuan, Y. T., Situ, J., Liao, X. H., Beresnitzky, A. V., ... & Maes, P. (2025). Your brain on ChatGPT: Accumulation of cognitive debt when using an AI assistant for essay writing task. https://doi.org/10.48550/arXiv.2506.08872

Loma Technology. (2025). Internet infrastructure in Cambodia: 2025 Outlook. https://lomatechnology.com/blog/internet-infrastructure-in-cambodia-2025-outlook/3148

Mehdaoui, A. (2024). Unveiling barriers and challenges of AI technology integration in education: Assessing teachers' perceptions, readiness and anticipated resistance. *Futurity Education*, *4*(4), 95-108. https://doi.org/10.57125/FED.2024.12.25.06

Mohamed, F. N., Azhar, J., Yasmeen, S., Hussain, I., & Khawar, M. (2025). Generative artificial intelligence and personalized learning environment: Challenges and opportunities. *Southern Journal of Computer Science*, *1*(01), 1-36. https://sjcs.isp.edu.pk/index.php/SJCS/article/view/5/8

Nosta, J (2025, January 19). *The shadow of cognitive laziness in the brilliance of LLMs: Cognitive offloading with AI boosts performance but may hinder deeper learning*. Psychology Today. https://www.psychologytoday.com/intl/blog/the-digital-self/202501/the-shadow-of-cognitive-laziness-in-the-brilliance-of-llms

Park, S., & Nan, X. (2025). Generative AI and misinformation: a scoping review of the role of generative AI in the generation, detection, mitigation, and impact of misinformation. *AI & SOCIETY*, 1-15. https://doi.org/10.1007/s00146-025-02620-3

Pereira, R., Reis, I. W., Ulbricht, V., & Santos, N. D. (2024). Generative artificial intelligence and academic writing: an analysis of the perceptions of researchers in training. *Management Research: Journal of the Iberoamerican Academy of Management*, *22*(4), 429-450. https://doi.org/10.1108/MRJIAM-01-2024-1501

Pulapaka, S., Godavarthi, S., & Ding, D. S. (2024). Introduction to generative AI. In *Empowering the Public Sector with Generative AI: From Strategy and Design to Real-World Applications* (pp. 1-29). Berkeley, CA: Apress. https://doi.org/10.1007/979-8-8688-0473-1_1

Pum, M., & Sok, S. (2024). Leveraging AI in education in Cambodia: A review of perceived concerns and associated benefits. *Asian Journal of Distance Education*, *19*(2), 157-167. https://asianjde.com/ojs/index.php/AsianJDE/article/view/794

Smerdon, D. (2024). AI in essay-based assessment: Student adoption, usage, and performance. *Computers and Education: Artificial Intelligence*, *7*. https://doi.org/10.1016/j.caeai.2024.100288

Sok, S., & Heng, K. (2024). Generative AI in higher education: The need to develop or revise academic integrity policies to ensure the ethical use of AI in Cambodia. *International Journal of Education and Research*, *6*(1). 1-8. https://www.cd-center.org/wp-content/uploads/2024/07/P124_20240702_V6IS1_EN.pdf

Sok, S., Heng, K., & Pum, M. (2025a). Investigating high school students' attitudes toward the use of AI in education: Evidence from Cambodia. *Sage Open*, *15*(3). https://doi.org/10.1177/21582440251353575

Sok, S., Heng, K., & Sol, K. (2025b). *Examining graduate students' experiences in using generative AI for academic writing: insights from Cambodian higher education*. Taylor & Francis. https://doi.org/10.1201/9781003567257-10

Sun, J. C. Y., Tsai, H. E., & Cheng, W. K. R. (2023). Effects of integrating an open learner model with AI-enabled visualization on students' self-regulation strategies usage and behavioral patterns in an online research ethics course. *Computers and Education: Artificial Intelligence*, *4*, Article 100120. https://doi.org/10.1016/j.caeai.2022.100120

Tukachinsky Forster, R., Kee, K., & Li, G. M. (2025). From digital divide to equity-enhancing diffusion: Generative AI and writing quality. *AI & SOCIETY*, 1-8. https://doi.org/10.1007/s00146-025-02739-3

van Niekerk, J., Delport, P. M., & Sutherland, I. (2025). Addressing the use of generative AI in academic writing. *Computers and Education: Artificial Intelligence*, *8*. Article 100342. https://doi.org/10.1016/j.caeai.2024.100342

Varsik, S., & Vosberg, L. (2024). *The potential impact of Artificial Intelligence on equity and inclusion in education*. OECD Publishing. https://doi.org/10.1787/15df715b-en

Wang, S., Hu, T., Xiao, H., Li, Y., Zhang, C., Ning, H., ... Ye, X. (2024). GPT, large language models (LLMs) and generative artificial intelligence (GAI) models in geospatial science: A systematic review. *International Journal of Digital Earth*, *17*(1). Article 2353122. https://doi.org/10.1080/17538947.2024.2353122

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education–where are the educators?. *International Journal of Educational Technology in Higher Education*, *16*(1), 1-27. https://doi.org/10.1186/s41239-019-0171-0

Zewe, A. (2023, November 9). *Explained: Generative AI*. MIT News. https://news.mit.edu/2023/explained-generative-ai-1109

Zhai, C., Wibowo, S., & Li, L. D. (2024). The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review. *Smart Learning Environments*, *11*(1), Article 28. https://doi.org/10.1186/s40561-024-00316-7

Zhang, Y., & Reusch, P. (2025, April). Trust in and adoption of generative AI in university education: Opportunities, challenges, and implications. In *2025 IEEE Global Engineering Education Conference (EDUCON)* (pp. 1-10). IEEE. https://doi.org/10.1109/EDUCON62633.2025.11016490

Zhao, D. (2025). The impact of AI-enhanced natural language processing tools on writing proficiency: An analysis of language precision, content summarization, and creative writing facilitation. *Education and Information Technologies*, *30*(6), 8055-8086. https://doi.org/10.1007/s10639-024-13145-5