OPEN PRAXIS

The Dual-Edged Sword of Generative AI in Cambodian Higher Education: Modeling the Influence of Perceived Benefits and Risks on Strategic Writing Outcomes

RESEARCH ARTICLES

MENGKORN PUM

INTERNATIONAL COUNCIL FOR OPEN AND DISTANCE EDUCATION

ABSTRACT

The rapid adoption of generative Artificial Intelligence (AI) tools in Cambodian higher education presents a 'dual-edged' phenomenon, simultaneously offering potential for personalized learning support while raising significant concerns regarding academic integrity and the development of higher-order cognitive skills. Despite this global shift, empirical evidence remains scarce, particularly within developing contexts such as Cambodian universities, where these tools could help address resource constraints. The study employed a quantitative cross-sectional design; data were collected from 324 undergraduate English majors using simple random sampling. This study adopted a perception–behavior–outcome lens, integrating the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT), to investigate how perceived benefits and risks influence AI usage patterns and subsequent writing-related outcomes using structural equation modeling. Findings revealed that perceived benefits and trust in AI were the strongest and most consistent antecedents, significantly enhancing all measured writing outcomes (confidence, motivation, creativity, critical thinking) both directly and indirectly. Crucially, these positive outcomes were mainly mediated by strategic AI use for idea generation and outlining, grammar correction and language enhancement, demonstrating that purposeful application is more influential than the pure frequency of use. Furthermore, perceived risks showed significant indirect effects via strategic use, indicating that students can be risk-aware yet still integrate AI effectively. The findings underscore those nurturing positive beliefs and promoting targeted, strategic AI usage—specifically for cognitive scaffolding—is central to responsibly enhancing student writing ability, confidence, and motivation in challenging educational environments.

CORRESPONDING AUTHOR:
Mengkorn Pum
University of Management and Economics, Cambodia
mengkornpum@gmail.com

KEYWORDS:
Artificial intelligence; higher education; educational technology; writing instruction; technology integration; student motivation; academic integrity; structural equation modeling; developing countries; Cambodia

TO CITE THIS ARTICLE:
Pum, M. (2026). The Dual-Edged Sword of Generative AI in Cambodian Higher Education: Modeling the Influence of Perceived Benefits and Risks on Strategic Writing Outcomes. *Open Praxis*, *18*(4), pp. 923–940. DOI: https://doi.org/10.55982/openpraxis.18.4.1084

INTRODUCTION

The growth of generative artificial intelligence (AI) adoption in higher education globally has changed the landscape of writing and writing instruction. Large language models (LLMs) and commercial AI writing assistants make writing jobs and writing assignments easier than ever before. For instance, with the potential capability in advanced grammar, writing revision platforms, and paraphrasing tools of ChatGPT, higher education students worldwide are increasingly using it to support drafting, editing, and idea generation of their writing tasks (Monib et al., 2024; Pum & Sok, 2024; Sok et al., 2025a; Yusuf et al., 2024). These tools potentially expand access to personalized writing support for students who have limited instructor feedback or face language barriers by offering them immediate feedback, enhancing fluency, and minimizing mechanical errors (Fošner, 2024; Ngo, 2023). Despite the potential benefits, generative AI also raises numerous significant concerns regarding authorship, academic integrity, and the effects of automated assistance on higher-order cognitive skills such as critical thinking and originality (Arowosegbe et al., 2024; Pum & Sok, 2024; Sol et al., 2025a; O'Dea, 2024; Wang et al., 2024).

The "dual-edged" nature of AI writing assistance is now widely recognized. On one edge, generative AI can function as a scaffold that reduces cognitive load for mechanical aspects of writing (e.g., grammar, sentence fluency), allowing learners to focus on higher-level rhetorical concerns (Li & Wilson, 2025; Monib et al., 2024). Prior studies revealed that generative AI can support revision practices, increase revision frequency, and provide rapid formative feedback when used thoughtfully (Pum & Sok, 2024; Wang et al., 2024). Yet, when the students use AI tools for content generation, for example, with unstructured or overreliance, it may encourage surface-level engagement, challenge authentic authorship norms, and risk diminishing students' opportunities to practice essential composing skills (O'Dea, 2024; Pum & Sok, 2024). Similarly, the study by Bozkurt et al. (2026) further revealed that the use of AI could weaken people's thinking skills, make qualifications less trustworthy, and create legal risks around data privacy. Therefore, institutional policy and instructional scaffolding play critical roles in shaping whether AI acts primarily as an educational tool or as a shortcut that undermines learning.

While Generative AI offers clear benefits, its integration in the Cambodian context is a dual-edged sword, where perceived risks may paradoxically drive more strategic usage. Previous studies on generative AI and writing have focused on well-resourced settings but have been less well-documented in developing countries like Cambodia (Sol et al., 2025b; Sol & Heng, 2024). Since the Cambodian higher education sector faced challenges with insufficient institutional resources, less teacher professional development, and a lack of qualified teachers (Heng & Sol, 2023; MoEYS, 2022; Sok & Bunry, 2023; Sot et al., 2019), leveraging AI writing tools could offer accessible language support and scaffold idea development for undergraduate students who face limited feedback opportunities (Sok & Heng, 2023; Sok & Heng, 2024a; Sok & Heng, 2024b). However, the adoption of such tools is based on the local perceptions of trust, academic norms, and infrastructure constraints. The empirical investigation of perceptions, usage patterns, and outcomes among Cambodian university students, therefore, fills an important regional and practical gap (Sok et al., 2025a; Sol et al., 2025b).

Understanding the pedagogical implications of AI writing tools requires attention to multiple dimensions. First, the perceptual dimension refers to how students view the usefulness, trustworthiness, and risks associated with AI, which shapes whether and how they adopt these technologies (Algerafi et al., 2023; Sok et al., 2025a), grounded on the technology acceptance, which emphasized that perceived usefulness and perceived ease of use are central drivers of technology adoption (Davis, 1989). Second, the behavioral dimension—patterns of use, frequency, and the specific writing tasks for which students deploy AI, which determines the form of interaction between learner and tools. Third, motivation, writing confidence, autonomous writing ability, creativity, and critical thinking—the affective and cognitive outcomes are the educational endpoints educators and researchers care about; these can be enhanced, undermined, or left unchanged depending on how perception and behavior interact in context.

The Technology Acceptance Model (TAM) and Self-Determination Theory (SDT) provide complementary frames for analyzing AI's role in writing. TAM emphasizes perceived usefulness and ease of use as proximal factors of acceptance (Davis, 1989). SDT, on the other hand, focuses on autonomy, competence, and relatedness as psychological needs that determine

intrinsic motivation; tools that support competence while preserving autonomy are more likely to support sustainable learning gains (Deci & Ryan, 2000). Integrating these perspectives suggests that students' beliefs about AI (TAM) influence whether they engage with AI in ways that either support or undermine their autonomy, competence, and motivation (SDT)—and that these psychological pathways, in turn, influence writing outcomes.

This study adopts a perception–behavior–outcome lens to examine AI adoption in academic and creative writing among Cambodian undergraduates as the specific study cases for the proposed model (see Figure 1). By focusing on these two distinct but related writing domains among Cambodian undergraduates, the research seeks to uncover how structural perceptions of benefits and risks manifest in diverse writing tasks. Rather than treating AI as inherently beneficial or harmful, the study conceptualizes AI use as a set of practices mediated by students' beliefs and contextual affordances. Specifically, the research investigates how perception factors (e.g., perceived benefits, trust, perceived risks, and perceived challenges) relate to behavioral indicators (frequency of use; purposes such as idea generation vs. grammar correction), and how these behavioral patterns correspond to affective and cognitive writing outcomes (e.g., motivation, confidence, autonomy, creativity, and critical thinking). By focusing the inquiry in a Cambodian EFL setting, the study aims to produce contextually grounded evidence that can inform educational policy and instructional design for responsible, pedagogically sound integration of generative AI in higher education. The central research question of this study, based on the identified gaps in existing literature, was: To what extent do perceived benefits and risks influence the writing outcomes of Cambodian undergraduate English majors, and how is this relationship mediated by strategic AI usage patterns?

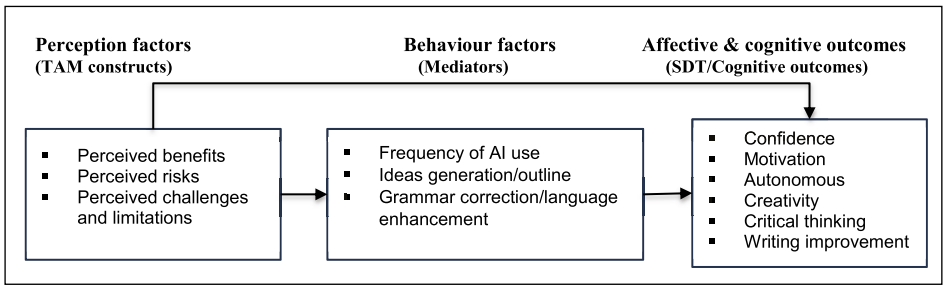

Figure 1 Conceptual model for the relationship between perception factors, behavior factors, and affective and cognitive factors among English major undergraduate students.

The remainder of this paper is organized as follows: Section 2 synthesizes the regional literature; Section 3 details the quantitative cross-sectional survey design and SEM methodology; Section 4 presents the objective results; and Section 5 discusses the broader implications for the Global South.

LITERATURE REVIEW

While global trends in AI are noted, this synthesis specifically centres on empirical findings from Southeast Asian and other Global South contexts, as the pedagogical challenges and resource constraints in Cambodian university EFL settings mirror these environments more closely than those in Western, high-resource contexts. Literature for this study was selected based on three primary criteria: (1) recency (2022–2026) to capture the rapid evolution of Generative AI; (2) context-specific relevance, prioritizing studies from the Global South and Southeast Asia; and (3) a focus on tertiary-level EFL writing and technology-enhanced language learning.

AI IN ACADEMIC & CREATIVE WRITING

Generative AI, especially ChatGPT and GPT-4, is changing writing. The development of artificial intelligence (AI) tools has occurred over the past decade. However, ChatGPT has recently become the most widely used AI application for teaching creative writing (Eriyanti & Sunaryo, 2025; Chenhuan et al., 2024). This AI tool boosts students' writing competency, primarily by streamlining brainstorming and facilitating research. Optimal results are achieved when AI functions as a partner in learning, integrated into effective teaching strategies, confirming that its value lies in supporting students' creative efforts, not replacing them (Eriyanti & Sunaryo, 2025). Studies further supported that AI assists general writing with lexical and syntactic suggestions, while in creative writing, it acts as a collaborator by generating materials and expanding concepts (Al Mahmud, 2023; Chenhuan et al., 2024). Aljuaid (2024) argued that

AI tools will not replace university academic writing courses soon. Although AI can help with grammar and style, it fails to teach essential skills like critical thinking, argumentation, research, and ethics, which are central to these courses. The researcher further recommended that the most effective approach is a balanced integration, where AI provides support without displacing the core academic curriculum.

While ChatGPT has seen rapid adoption among university students for drafting and language support, research in the Pakistani context highlights a precarious transition period. Afzal et al. (2025) note that while students report productivity gains, such as faster writing and overcoming language difficulties, and greater creative output, these are frequently overshadowed by systemic risks, including the generation of fabricated citations and a lack of ethical transparency. This suggests that without clear university guidelines, the perceived benefits of AI may be undermined by significant threats to academic integrity. Even with these issues, the majority of students view AI positively and support its use in education (Afzal et al., 2025). It was found to foster new ways of storytelling, such as non-linear and hybrid narratives, and make literary production more widely accessible (Begum, 2025; Eriyanti & Sunaryo, 2025). Acting as a co-creator, AI influences writing by promoting stylistic similarity and generating fresh thematic concepts compared to human-only texts (Begum, 2025; Eriyanti & Sunaryo, 2025; Pum, 2026). Despite these benefits, the study confirms serious unresolved concerns regarding the genuineness of creativity, questions of ethical authorship, and the status of AI-generated work as an art commodity, ultimately requiring a complete re-evaluation of current literary theory and practice (Begum, 2025; Sok & Heng, 2024b).

The review on AI use in Cambodia's education identified five major concerns: privacy and security, decline in critical thinking/creativity, risks of academic misconduct, assessment issues, and superficial/biased information (Pum & Sok, 2024). Similarly, Sok et al. (2025a) highlighted major concerns regarding data privacy, over-dependence on AI, and limited originality. Students were reported to be less worried about reduced critical thinking or inaccurate AI responses. Conversely, Sok et al. (2025a) also found that students hold generally favorable attitudes toward using AI tools in education, especially for completing schoolwork. They identified key benefits, including assistance with language learning, summarizing, translating, and brainstorming. Pum and Sok (2024) further highlighted several benefits, including personalized learning, enabling innovative assessment/pedagogy, enhancing productive administration, and providing academic writing support.

PERCEPTIONS OF AI WRITING TOOLS

Previous studies consistently found that students reported a positive attitude toward AI use in their learning. The work of Kanashina (2026) found that students who are familiar with ChatGPT and know how to apply it tend to use it more frequently. This usage encourages continued use and also shapes how students perceive ethical issues and plagiarism, showing that ChatGPT influences attitudes toward academic integrity. In terms of students' perception towards writing, Sok et al. (2025b) found that generative AI significantly improved writing skills and increased confidence among Cambodian graduate students. A similar finding was found in the study Khalifa and Albadawy (2024), which found that AI improves writing in six ways, such as idea generation, content structuring, literature synthesis, data management, editing, and ethical compliance. In all of these areas, ChatGPT has been found to be a useful tool. However, when integrating AI tools in writing, some major challenges raised included incomplete, non-contextual AI outputs, and the risk of reduced critical thinking/creativity, and academic integrity (Hoeurng et al., 2024; Khalifa & Albadawy, 2024; Pum & Sok, 2024; Sok et al., 2025b). The findings emphasize that AI-human collaboration and capacity development to promote ethical use and prevent over-dependence on AI are necessary (Khalifa & Albadawy, 2024; Sok et al., 2025b).

A study in Korea found that Korean university students reported AI writing tools beneficial for improving English skills, citing accessibility and error correction. However, over-reliance risks hindering students' writing development (Lee et al., 2024; Pum, 2025; Pum & Sok, 2024; Sok et al., 2025a). The study advocates effective integration of AI into teaching (Lee et al., 2024; Pum & Sok, 2024; Sok & Heng, 2024b). Separately, a study of freshmen identified distinct user types regarding AI writing tools. Some students use AI uncritically, increasing the risk of plagiarism, while others avoid the tools due to skepticism or poor study habits. This necessitates

individualized teaching strategies to guide proper and safe AI interaction (Burkhard, 2022; Pum & Sok, 2024). In terms of using AI in scientific research, Kacena et al. (2024), the study found that using ChatGPT to write scientific review articles reduced the overall writing time but dramatically increased the need for fact-checking due to significant inaccuracies (up to 70% of AI-only references were false). The AI-assisted approach showed the highest risk of plagiarism (highest similarity indices) (Kacena et al., 2024; Pum & Sok, 2024).

The study by Sol et al. (2025b) revealed that EFL university students perceived AI tools as useful for assignments and language acquisition, but key challenges include data privacy, lack of human interaction, and accuracy doubts. Similarly, the study found high engagement with AI tools among undergraduate students in Battambang (Cambodia), primarily for language translation and writing enhancement. Despite this high usage, most students lack formal training (Hoeurng et al., 2024; Sol et al., 2025b). While students value AI's efficiency and personalized learning, they simultaneously voiced concerns regarding data privacy, algorithmic biases, and the impact on critical thinking skills (Hoeurng et al., 2024; Pum & Sok, 2024). In contrast with prior studies, Sok et al. (2025a) studied high school students' attitudes toward AI and found that students positively view AI tools as a learning aid and reported minimal concern regarding the possibility that AI might diminish their critical thinking and creativity or provide them with inaccurate information.

USE AND ENGAGEMENT WITH AI WRITING TOOLS

A growing body of empirical literature suggests that student engagement serves as a fundamental catalyst for academic performance in digital learning environments. Recent empirical evidence has highlighted the positive impact of generative AI on this engagement; for instance, Zare et al. (2025) demonstrated that incorporating ChatGPT into English argumentative essay assignments particularly improved the level of task engagement among undergraduate English as a Foreign Language (EFL) students. Rad et al. (2024), in their experiment, found that the experimental group using the AI-based application Wordtune demonstrated significant improvements in second language writing outcomes, writing engagement, and writing feedback literacy compared to the control group. Furthermore, the study of Sumakul et al. (2022) revealed that EFL university students in Indonesia generally have a favorable view of using an AI application in their writing instruction. Students indicated they found the learning experience enjoyable and confirmed that the AI tool was instrumental in improving their writing skills. These AI tools were valuable for boosting efficiency, productivity, and accuracy in tasks such as grammar checking and managing references (Rabbianty et al., 2023).

A comprehensive review by Alharbi (2023) found that students are adopting a wider range of AI-driven writing aids to enhance their compositions. These tools generally fall into four distinct categories: automated systems for evaluating writing quality, applications that deliver instant error correction feedback, AI-based machine translation services, and automatic text generation models like GPT-3. Previous studies demonstrated that AI-supported writing tools such as Quillbot, WordTune, Jenni, Chat-GPT, Paperpal, Copy.ai, and Essay Writer are beneficial for idea generation and enriching content; they effectively enhance the clarity, coherence, structure, and logical progression of student writing by suggesting better wording and detecting inconsistencies (Al Mahmud, 2023; Marzuki et al., 2023). These tools also provided both advantages (vocabulary enhancement, reduced repetition) and disadvantages (risk of overly complex language and dependence); however, a risk of over-reliance, limiting critical thinking and creativity, was also noted (Hoeurng et al., 2024; Marzuki et al., 2023; Pum & Sok, 2024).

AFFECTIVE AND COGNITIVE OUTCOMES

Current research into the integration of AI tools in writing suggests a multifaceted impact on both affective and cognitive learner outcomes. Findings from Bachtiar (2026) and Zare et al. (2025) indicated that an integrated AI tool in writing enhances affective engagement by fostering greater motivation, lower anxiety, increased interest, and a sense of partnership. Furthermore, these tools appear to support cognitive and meta-cognitive development by providing personalized feedback that enhances learners' self-efficacy and their ability to self-regulate the writing process (Bachtiar, 2026; Zare et al., 2025). Further to this, a separate study showed that the way students interacted with the Learnalytics (a GAI-driven writing evaluation

tool) and their resulting level of engagement (including behavioral, cognitive, and affective) was significantly shaped by their personal characteristics, their prior writing experiences, and their unique approach to the writing process (Yeung, 2025). A similar finding has been found when integrating ChatGPT into English as a Foreign Language (EFL) writing instruction. Anjarani et al. (2024) found that integrating ChatGPT significantly raised student engagement levels (across behavioral, cognitive, and emotional dimensions) compared to traditional teaching. This is because ChatGPT provided instant, customized support that helped create a learning environment focused on the student. The findings strongly affirm ChatGPT's ability to boost motivation and strengthen students' connection to their assignments.

Furthermore, a previous study showed a strong correlation between willingness to embrace AI and their confidence in their writing ability (Farahian & Rezaee, 2025). They added that the extent of the benefits depended heavily on the user's experience level, with experienced users utilizing more sophisticated functions. Furthermore, the acceptance of AI was moderated by emotional factors (like enthusiasm or doubt) and existing institutional or ethical challenges. Additionally, AI-supported writing tool integration in writing has also been found to improve students' writing performance and motivation (Silitonga et al., 2023; Song & Song, 2023). Such tools helped individuals improve skills across multiple areas of writing, such as structuring ideas, maintaining logical flow, applying correct grammar, and using varied vocabulary (Al Mahmud, 2023; Marzuki et al., 2023; Song & Song, 2023). Silitonga et al. (2023) suggested that incorporating an AI chatbot-based learning noticeably improves student motivation when learning English writing. This is because of chatbots' capacity to offer more thorough and specific feedback than a teacher might deliver individually, in that way helping students pinpoint areas for improvement and focus their efforts more effectively. Similar findings in the experimental study that using ChatGPT by Suciati et al. (2024) indicated that participants who used ChatGPT experienced a considerable increase in both their motivation and engagement compared to the control group. This improvement was evident in higher levels of both internal (intrinsic) and external (extrinsic) drive, along with better cognitive, behavioural, and emotional involvement in the tasks.

The study found that German language students developed "shared agency" with AI tools (like ChatGPT), employing different integration strategies based on their background (e.g., heritage speakers for accuracy, classroom learners for communication). Autonomy development required critical evaluation of AI output and strategic integration while preserving the learner's language writing voice and personal control (Alm, 2024). Recent studies by Zulkefli and Ismail (2025) identified six key dimensions of AI-supported learner autonomy (goal setting, editing, decision-making, motivation, critical thinking, and monitoring). The found AI tools boosted writing fluency, planning, and confidence. However, major challenges include student over-reliance on AI, lack of critical engagement, and digital literacy gaps. The findings underscore AI's dual role as a scaffold and potential barrier to autonomy, requiring focused instructional strategies.

METHOD

RESEARCH DESIGN

Previous studies on AI use in academic writing have largely focused on developed contexts or theoretical analyses, leaving the relationships between students' perceptions, behaviors, and learning outcomes underexplored in developing contexts such as Cambodia. To address this gap, a quantitative, cross-sectional survey design was employed in this study to examine the relationships between the perception factors of AI usage in academic writing, students' behavioral factors in using AI in academic writing, and the affective & cognitive outcomes. A quantitative method facilitates the organized gathering and statistical examination of numerical information to uncover trends and relationships among variables (Creswell & Creswell, 2018). This design makes it possible to efficiently gather data from a sizable sample and makes it easier to extrapolate results to a larger population (Fraenkel et al., 2019) and was employed to record participants' opinions and experiences at a certain moment in time (Sedgwick, 2014), but a survey approach is in line with earlier studies examining attitudes, perceptions, and behavioral inclinations in educational and psychological contexts (Bryman, 2016). The structured questionnaire employed in this study consisted of standardized

items measured on a 5-Likert scale, ensuring reliability and comparability across replies (Dillman et al., 2014).

PARTICIPANTS AND PROCEDURES

A total of 324 students participated in this study. The participants from both public and private universities across Cambodia were randomly selected and were undergraduate English major students. These students were selected because they are actively engaged in academic and creative writing as part of their coursework, making them an appropriate sample for examining how perceptions and usage of AI tools relate to writing outcomes. Most of the students were aged between 18 to 24 years old (87.7%). The contribution of the participants was 56.5% from the capital city of Cambodia (Phnom Penh), and the rest was from other provinces. Before the data were collected, we obtained permission from the universities. After obtaining the permission, we conducted our pilot survey with forty-five university students to check the participants' understanding of the questionnaire, identify any ambiguities, and ensure the clarity and reliability of the survey items before the main data collection. Finally, in June 2025, after a pilot study and questionnaire revision, we conducted the main data collection with the students via a Google Form. On average, participants took 14 minutes to complete the survey questionnaire, responding voluntarily and anonymously.

MEASUREMENT

In this study, the researcher developed a new 46-item survey questionnaire to measure the study constructs. All items developed in this current study are based on the review of the previous relevant studies and conceptual frameworks (DeVellis & Thorpe, 2021; Hair et al., 2019). To capture students' level of agreement, a five-point Likert scale (1 = strongly disagree; 5 = strongly agree) was used to measure all items. The Confirmatory Factor Analysis (CFA) was conducted before the main analysis to measure the reliability and validity of the study constructs. According to Byrne (2016) and Kline (2016), the preferred standardized factor loadings were 0.50, and items below this recommended threshold were removed from the final measurement model (Byrne, 2016; Kline, 2016). This strategy was applied to improve the construct validity and model fit, ensuring that all latent variables were represented by strongly related indicators. The remaining items were measured for internal consistency using Cronbach's alpha, convergent validity using composite reliability (CR), and average variance extracted (AVE) values (Fornell & Larcker, 1981; Hair et al., 2019). The acceptable psychometric properties of the remaining items confirmed that the measurement model was appropriate for the study, indicating it successfully represented the latent structure (underlying dimensions) of the constructs being investigated.

DATA ANALYSIS

The study involved a comprehensive four-step data analysis strategy. The four-step analysis strategy follows established practices in educational and psychological research, ensuring both validity and reliability of the measurement model (CFA, Cronbach alpha) and rigor in testing hypothesized relationships (correlations, SEM) as supported by prior literature (Hair et al., 2019; Bryman, 2016) (see Table 1). Specifically, confirmatory factor analysis (CFA) was initially performed to examine the construct validity of the adapted scales in the sample under study. Construct validity was specifically evaluated through convergent and discriminant validities. Convergent validity was considered acceptable when the factor loading exceeded 0.50, construct reliability (CR) was 0.70 or higher, and average variance extracted (AVE) was 0.50 or higher (Hair et al., 2019). Discriminant validity was ensured when the inter-construct correlations were smaller than the corresponding square root values of AVE (Fornell & Larcker, 1981). Following this, scales' reliabilities were calculated using the Cronbach alpha coefficient. The third step involved computing bivariate correlations between all study variables. To evaluate the structural model, mediation analysis was employed. In this study, mediation is defined as the statistical process where the effect of the independent variable on the dependent variable is transmitted through the intervening variables. This approach allows for the decomposition of total effects into direct and indirect effects (Hayes, 2022). Specifically, Structural Equation Modelling (SEM) was utilized to examine how perception factors (i.e., perceived benefits, perceived risks, perceived challenges and limitations) and behavioral factor (i.e., frequency of AI use, ideas generation/outline, grammar correction/language enhancement) are associated

with affective & cognitive outcomes (confidence, motivation, autonomous, creativity, critical thinking, writing improvement). Structural paths in SEM were specified according to the perception–behavior–outcome framework, with perception and behavioral factors hypothesized to influence cognitive and affective writing outcomes, consistent with prior empirical studies linking technology acceptance and self-determination to learning behaviors (Davis, 1989; Deci & Ryan, 2000).

Model fit was evaluated based on the following indices: the chi-square (χ^2)/degree of freedom (df) (acceptable when not exceeding 3), the Comparative Fit index (CFI) and Tucker-Lewis Index (TLI) (acceptable when exceeding 0.92), the Standardized Root Mean Residual (SRMR) (acceptable when not exceeding 0.08, ideally with CFI above 0.92), and the Root Mean Squared Error of Approximation (RMSEA) (acceptable when not exceeding 0.07, ideally with CFI of 0.92 or higher) (Hair et al., 2019; Hu & Bentler, 1999; Kline, 2016). All CFA and SEM models were estimated using JASP 0.19.3.

Table 1 Overview of data analysis steps.

Note. CFA = confirmatory factor analysis; SEM = structural equation modeling.

STEP	PURPOSE	ANALYSIS	VARIABLES	LITERATURE SUPPORT
1	Validate measurement model	CFA	Perception factors: perceived benefits, risks, challenges; Behavioral factors: AI use patterns	(Fornell & Larcker, 1981; Hair et al., 2019)
2	Assess reliability	Cronbach's alpha	All scales	(Creswell & Creswell, 2018)
3	Examine associations	Bivariate correlations	All study variables	(Bryman, 2016)
4	Test structural relationships	SEM	Perception → behavioral factors → cognitive & affective outcomes	(Hair et al., 2019; Hayes, 2022; Hu & Bentler, 1999; Kline, 2016)

ETHICAL CONSIDERATIONS

This study was conducted in accordance with ethical standards for human subject research. Before the data was collected, we asked permission from the universities. All participants involved in this study were volunteers and provided verbal and digital informed consent. In the questionnaire's cover page, the purpose of the study and the informed consent to use participants' data for research and publication were mentioned; and we informed the participants in the questionnaire that by submitting their responses, they allowed us to use their data for research and publication purposes. All participants were informed that they could withdraw from the study at any time without giving any reason. To ensure the anonymity of the respondents, the identifiable personal information of the participants was not collected, while the data were stored in a folder with a password, which allowed only the researcher access to this data, to ensure the confidentiality of the respondents.

RESULTS

CONFIRMATORY FACTOR ANALYSIS

Following a check confirming no normality violations or missing data. Prior to the main SEM analysis, Confirmatory Factor Analysis (CFA) was executed for both the individual measures and the entire nine-construct measurement model (Tables 2 and 3), confirming the validity of all scales. Convergent validity was supported by factor loadings (0.62 to 0.87), high CRs (0.75 to 0.88), and generally acceptable AVEs (0.49 to 0.72) (Hair et al., 2019). Discriminant validity was also confirmed, as the square root of AVE for each construct exceeded its inter-construct correlations (Fornell & Larcker, 1981; Hair et al., 2019). The absence of multicollinearity was further verified by Heterotrait-Monotrait ratios being below 0.80 (Table 4; Kline, 2016). Overall, the measurement model showed a strong fit to the data ($\chi^2(341) = 658.306$, $p < 0.001$; CFI/TLI = 0.96; SRMR/RMSEA = 0.05), validating the measures and enabling the progression to SEM.

DESCRIPTIVE STATISTICS AND BIVARIATE CORRELATIONS

Table 5 presents the descriptive statistics and bivariate correlations among the latent variables, measured across both academic and creative writing tasks. Including both forms

FIT INDEX	VALUE	CRITERION FOR GOOD FIT	INTERPRETATION
X^2/df	1.93	<3	Good fit
RMSEA	0.05	≤0.06	Good fit
SRMR	0.05	≤0.08	Good fit
CFI	0.96	≥0.90	Acceptable fit
TLI	0.96	≥0.90	Acceptable fit

Table 2 Confirmatory factor analysis model fit.

Note. χ^2/df = chi-square divided by degrees of freedom; RMSEA = root mean square error of approximation; SRMR = standardized root mean residual; CFI = comparative fit index; TLI = Tucker-Lewis's index.

VARIABLE	FACTOR LOADING	CR	AVE/SQUARE ROOT	COEFFICIENT ω	COEFFICIENT α
AIWC	0.71–0.78	0.88	0.55/0.74	0.85	0.84
AIAW	0.68–0.79	0.79	0.55/0.74	0.73	0.71
AIWM	0.74–0.78	0.84	0.57/0.75	0.79	0.78
AICL	0.64–0.76	0.74	0.49/0.70	0.70	0.69
AICW	0.81–0.87	0.88	0.72/0.85	0.81	0.82
AIBT	0.62–0.86	0.76	0.52/0.72	0.69	0.70
EAIWI	0.69–0.73	0.76	0.51/0.71	0.70	0.69
RAIW	0.76–0.79	0.75	0.60/0.74	0.69	0.69
AICTW	0.74–0.80	0.75	0.60/0.74	0.66	0.68

Table 3 Factor loadings, CRs, AVEs, square root of the AVE, coefficient ω, coefficient α.

Note. CR = Composite Reliability; AVE = Average Variance Extracted; √AVE = Square root of AVE; ω = McDonald's omega; α = Cronbach's alpha. AIWC = writing confidence; AIAW = autonomous writing ability; AIWM = writing motivation, AICL = challenges and limitations, AICW = writing creativity, AIBT = perceived benefits and trust, EAIWI = perceived effectiveness; RAIW = perceived risks; AICTW = critical thinking in writing; FAIW = Frequency of AI tool use; AIGO = idea generation and outline; AIGL = grammar and language enhancement.

	1	2	3	4	5	6	7	8	9
AIWC	1								
AIAW	0.70	1							
AIWM	0.72	0.61	1						
AICL	0.18	0.26	0.32	1					
AICW	0.59	0.51	0.69	0.30	1				
AIBT	0.65	0.43	0.38	0.08	0.48	1			
EAIWI	0.66	0.66	0.65	0.25	0.70	0.59	1		
RAIW	0.22	0.25	0.43	0.74	0.41	0.12	0.40	1	
AICTW	0.62	0.52	0.60	0.22	0.67	0.42	0.67	0.27	1

Table 4 Heterotrait-monotrait ratio.

of writing is justified because Cambodian English-major undergraduates engage in both types of writing, and AI tools are similarly applied to support idea generation, drafting, and language enhancement. Correlation analyses revealed that all latent variables had small to moderate correlations (ranging from 0.13 to 0.58), except perceived benefits and trust (AIBT), and perceived risks (RAIW) showed a nonsignificant relationship ($p > 0.05$). Writing confidence (AIWC) was strongly and positively correlated with autonomous writing ability (AIAW), writing motivation (AIMW), writing creativity (AICW), perceived benefits and trust (AIBT), and perceived effectiveness(EAIWI). Moreover, autonomous writing ability (AIAW) was also significantly associated with AIWM, AICW, and EAIWI. Similarly, AIWM showed strong positive correlations with AICW and EAIWI. The challenges and limitations (AICL) exhibited weak to moderate positive correlations with most variables, particularly with perceived risks. Frequency of AI tool use (FAIW) was moderately associated with perceived benefits and trust (AIBT), AIWC, idea generation and outline (AIGO), grammar and language enhancement (AIGL), and critical thinking in writing (AICTW). The results indicate a coherent pattern of positive relationships among confidence, motivation, creativity, perceived benefits, frequency of AI tool use, idea generation and outline, and grammar and language enhancement, while perceived challenges and risks maintained only weak to moderate associations with these positive dimensions.

PATH ANALYSIS

Table 6 presents the standardized path coefficients (β), standard errors (SE), and associated z-values for the structural model. The structural analysis reveals that perceived trust and idea

VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12
AIWC	—											
AIAW	0.54***	—										
AIWM	0.58***	0.46***	—									
AICL	0.17**	0.20***	0.26***	—								
AICTW	0.47***	0.36***	0.44***	0.17**	—							
EAIWI	0.50***	0.46***	0.48***	0.18**	0.47***	—						
RAIW	0.18**	0.19***	0.32***	0.52***	0.19***	0.28***	—					
AICW	0.49***	0.39***	0.56***	0.23***	0.50***	0.54***	0.32***	—				
AIBT	0.51***	0.32***	0.31***	0.13*	0.30***	0.43***	0.09	0.38***	—			
FAIW	0.37***	0.30***	0.20***	0.17**	0.30***	0.27***	0.16**	0.24***	0.49***	—		
AIGO	0.29***	0.43***	0.37***	0.21***	0.28***	0.37***	0.22***	0.39***	0.26***	0.26***	—	
AIGL	0.32***	0.33***	0.44***	0.22***	0.30***	0.41***	0.27***	0.39***	0.28***	0.32***	0.40***	—
Mean	3.44	3.57	3.70	3.50	3.63	3.81	3.89	3.79	3.27	3.13	3.65	
SD	0.59	0.63	0.58	0.65	0.61	0.59	0.79	0.60	0.61	0.91	0.76	
Skewness	0.03	−0.24	−0.22	−0.29	−0.27	−0.21	−0.53	−0.24	0.06	−0.01	−0.38	
Kurtosis	0.10	0.81	0.53	0.73	0.67	−0.14	0.48	0.86	0.28	−0.36	0.35	

Table 5 Descriptive statistics and bivariate correlations between latent variables (N = 324).

*p < .05, **p < .01, ***p < .001.

Notes: AIWC = writing confidence; AIAW = autonomous writing ability; AIWM = writing motivation, AICL = challenges and limitations, AICW = writing creativity, AIBT = perceived benefits and trust, EAIWI = perceived effectiveness; RAIW = perceived risks; AICTW = critical thinking in writing; FAIW = Frequency of AI tool use; AIGO = idea generation and outline; AIGL = grammar and language enhancement.

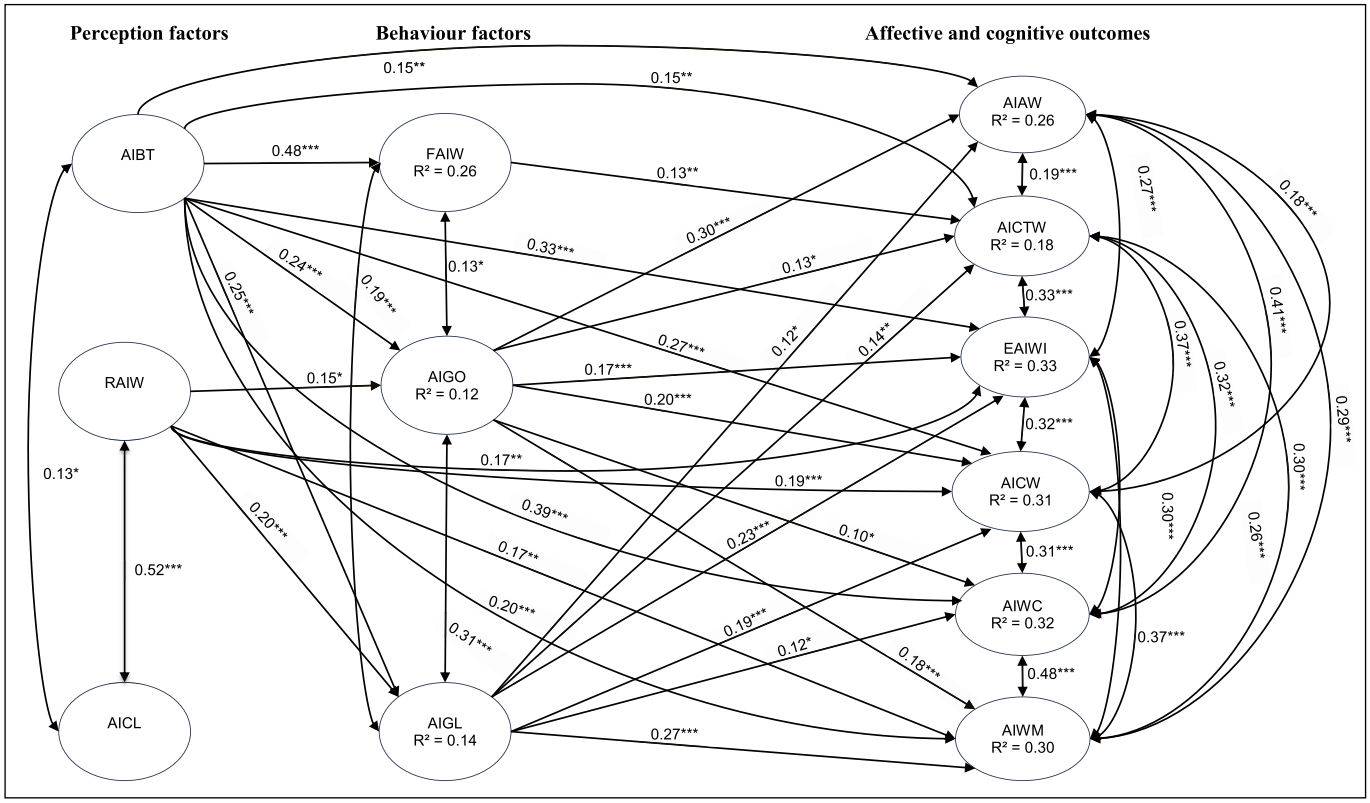

Figure 2 Standardized coefficients for the model of the relationships between perception factor, behavior factors, and affective and cognitive factors (N = 324).

*p < 0.05; **p < 0.01; ***p < 0.001.

Notes. AIWC = writing confidence; AIAW = autonomous writing ability; AIWM = writing motivation, AICL = challenges and limitations, AICW = writing creativity, AIBT = perceived benefits and trust, EAIWI = perceived effectiveness; RAIW = perceived risks; AICTW = critical thinking in writing; FAIW = Frequency of AI tool use; AIGO = idea generation and outline; AIGL = grammar and language enhancement.

PATH			β	SE	Z-VALUE	95% CI
AIGO	→	AIAW	0.30***	0.05	5.74	[0.20–0.40]
AIGL	→	AIAW	0.12*	0.06	2.21	[0.01–0.23]
AIBT	→	AIAW	0.15**	0.06	2.73	[0.04–0.26]
FAIW	→	AICTW	0.13*	0.06	2.15	[0.01–0.24]
AIGO	→	AICTW	0.13*	0.06	2.24	[0.02–0.24]
AIGL	→	AICTW	0.14**	0.06	2.50	[0.03–0.26]
AIBT	→	AICTW	0.15**	0.06	2.56	[0.04–0.27]
AIGO	→	EAIWI	0.17***	0.05	3.40	[0.07–0.27]
AIGL	→	EAIWI	0.23***	0.05	4.38	[0.13–0.33]
AIBT	→	EAIWI	0.33***	0.05	6.31	[0.23–0.43]
RAIW	→	EAIWI	0.17**	0.05	3.10	[0.06–0.27]
AIGO	→	AICW	0.20***	0.05	3.94	[0.10–0.30]
AIGL	→	AICW	0.19***	0.05	3.59	[0.09–0.29]
AIBT	→	AICW	0.27***	0.05	5.10	[0.17–0.37]
RAIW	→	AICW	0.19***	0.06	3.55	[0.09–0.30]
AIGO	→	AIWC	0.10*	0.05	1.93	[0.00–0.20]
AIGL	→	AIWC	0.12*	0.05	2.28	[0.02–0.22]
AIBT	→	AIWC	0.39***	0.05	7.63	[0.29–0.49]
AIGO	→	AIWM	0.18***	0.05	3.37	[0.07–0.28]
AIGL	→	AIWM	0.27***	0.05	5.22	[0.17–0.38]
AIBT	→	AIWM	0.20***	0.05	3.62	[0.09–0.30]
RAIW	→	AIWM	0.17**	0.06	3.08	[0.06–0.28]
AIBT	→	FAIW	0.48***	0.04	11.23	[0.40–0.56]
AIBT	→	AIGO	0.24***	0.05	4.65	[0.14–0.34]
RAIW	→	AIGO	0.15**	0.06	2.44	[0.03–0.27]
AIBT	→	AIGL	0.25***	0.05	4.89	[0.15–0.35]
RAIW	→	AIGL	0.20***	0.06	3.42	[0.09–0.32]

Table 6 Path coefficients.

* p < .05, ** p < .01, *** p < .001.

generation are the primary drivers of writing confidence and autonomous ability, significantly outperforming simple frequency of use. Paradoxically, perceived risk does not deter students but instead triggers more strategic, high-level engagement with AI, suggesting a pragmatic trust model unique to the Cambodian EFL context. Specifically, Path analysis revealed that perceived benefits and trust (AIBT) emerged as the strongest and most consistent predictors across all writing-related outcomes. Perceived benefits and trust (AIBT) directly and significantly enhanced students' writing confidence (AIWC), writing creativity (AICW), writing motivation (AIWM), perceived autonomous writing ability (AIAW), critical thinking in writing (AICTW), and perceived effectiveness of (EAIWI) (β = 0.15–0.48, p < .01). Moreover, AIBT exerted significant indirect effects on these outcomes through two main mediators: idea generation and outlining (AIGO) and grammar and language enhancement (AIGL). In this study, mediators (AIGO and AIGL) represent the behavioral processes through which students' perceptions of AI (e.g., AIBT, RAIW) influence writing outcomes. While all mediators are variables, not all variables are mediators: mediators specifically explain how the independent variables affect dependent outcomes, allowing us to evaluate the mechanisms of influence using SEM. These indirect effects were consistently significant across models (β = 0.03–0.07, p < .01), indicating that students who used AI for idea and language support reported higher writing motivation, confidence, and creativity. However, the frequency of AI tool use (FAIW) mediates only the relationships between AIBT and AICTW (β = 0.06, p = 0.04), suggesting that the purposeful use of AI is more influential than how often students use it.

Perceived risks (RAIW) also showed several significant relationships. Although RAIW had only modest direct effects on writing outcomes, it produced indirect effects via AIGO and AIGL on AIAW, AICTW, EAIWI, AICW, and AIWM ($\beta = 0.03–0.06$, $p < .05$), implying that students aware of AI risks may still use AI strategically in ways that improve their writing outcomes. Conversely, challenges and limitations (AICL) had no significant direct effects on any outcome variables and only weak indirect paths, suggesting that the perceived difficulties of AI use do not substantially hinder writing development in this sample. Overall, the model explained a moderate to high proportion of variance in the outcome variables ($R^2 = 0.12–0.33$), with the highest explanatory power for perceived effectiveness of AI for writing improvement ($R^2 = 0.33$), writing confidence ($R^2 = 0.32$), writing creativity ($R^2 = 0.31$), and writing motivation ($R^2 = 0.30$) (see Figure 2).

DISCUSSION

The current study investigated the antecedents, usage patterns, and outcomes of AI tool adoption in academic and creative writing among Cambodian university students, applying a perception–behavior–outcome lens informed by the Technology Acceptance Model (TAM) and Self-Determination Theory (SDT). The study found that students who trust AI and use it for brainstorming ideas feel much more confident and independent in their writing than those who just use it frequently. Interestingly, even when students are aware of the risks (like AI making mistakes), they do not stop using it; instead, they use it more carefully and strategically to improve their creative work. Our findings clarify the "dual-edged" nature of generative AI in this context, demonstrating that positive perceptual factors and strategic, purposeful use are the central mechanisms driving positive writing-related outcomes. The mediation analysis explicitly established perceived benefits and trust (AIBT) as the strongest and most consistent predictor, directly and indirectly enhancing all measured writing outcomes (confidence, motivation, creativity, and critical thinking). This finding strongly validates the core principles of the Technology Acceptance Model (TAM) (Davis, 1989), demonstrating that a student's belief in the utility and trustworthiness of AI is the critical initial filter for successful integration.

While the Technology Acceptance Model (TAM) effectively captures the perceived usefulness of AI in this study, our findings also resonate with the Unified Theory of Acceptance and Use of Technology (UTAUT2). Specifically, the strong influence of perceived benefits (AIBT) reflects the performance expectancy construct of UTAUT2 (Tamilmani et al., 2021; Xue et al., 2024). However, a notable divergence appears when compared to Innovation Diffusion Theory (IDT) (Ghimire & Edwards, 2024; Singh & Strzelecki, 2026). While IDT typically suggests that high complexity (perceived challenges) hinders adoption, Cambodian undergraduates in this study appear to embrace the complexity of AI as a form of strategic scaffolding. This suggests that in resource-constrained EFL environments, the relative advantage of AI outweighs the traditional barriers found in early technology adoption models, pointing toward a more pragmatic acceptance profile unique to the Global South.

Our results were also consistent with and extend prior studies in Cambodia (Sok et al., 2025a; Sol et al., 2025b), which found generally favorable attitudes toward AI. Crucially, the positive effect of AIBT on affective and cognitive outcomes (motivation, confidence) is consistent with Self-Determination Theory (SDT) (Deci & Ryan, 2000). By offering accessible, personalized support—a valuable resource in contexts facing teacher qualification or resource scarcity (Heng & Sol, 2023)—AI enhances the students' perceived competence, which is essential for fostering intrinsic motivation (Silitonga et al., 2023; Suciati et al., 2024).

A central contribution of this study is the clarification that strategic use patterns, rather than the mere frequency of use (FAIW), are the key mediators driving positive outcomes. Traditionally, scaffolding involves a teacher providing temporary support to help a learner master a task. However, our findings suggest a shift toward student-initiated scaffolding. This is demonstrated by the consistently significant indirect effects of AIBT on outcomes via idea generation and outlining (AIGO) and grammar and language enhancement (AIGL). The findings indicated that AIGL plays as a cognitive scaffold: The effective use of AI for grammar, error correction, and language enhancement validates the "scaffolding" role of AI (Li & Wilson, 2025; Monib et al., 2024). By reducing the cognitive load associated with the mechanical aspects of writing, the role of AI in grammar and language enhancement frees students to concentrate on higher-level rhetorical concerns such as argumentation, structure, and logical flow (Marzuki et al., 2023;

Song & Song, 2023). In this model, the AI does not simply 'provide answers'; rather, it acts as a cognitive extension that allows Cambodian EFL students to manage the heavy linguistic load of English writing. This aligns with findings that AI-assisted revision improves fluency and minimizes mechanical errors (Fošner, 2024; Ngo, 2023). Additionally, the role of AI in idea generation and outlining plays as a creative collaborator: The mediation via idea generation and outlining demonstrates that students are utilizing AI as a true "co-creator" or partner to generate material and expand concepts (Al Mahmud, 2023; Chenhuan et al., 2024). This strategic deployment directly supports outcomes like enhanced creativity and motivation by streamlining the brainstorming process, confirming the value of AI in supporting—rather than replacing—creative efforts (Eriyanti & Sunaryo, 2025; Silitonga et al., 2023; Song & Song, 2023; Zare et al., 2025).

The finding that frequency of AI tool use (FAIW) was only a weak mediator (only relating to AICTW) is critical. It reinforces the scholarly concern that unstructured or high-volume usage, often leading to over-reliance, risks diminishing students' opportunities to practice essential composing skills and encourages only surface-level engagement (O'Dea, 2024; Pum & Sok, 2024). Our data thus distinguishes between productive, strategic engagement (AIGO, AIGL) and potentially unproductive, high-frequency behavior. When students engage in strategic scaffolding, they are intentionally using AI for idea generation and linguistic refinement to bridge the gap between their current proficiency and the requirements of academic discourse. This is not a passive reliance; it is a critical interaction where the scaffold—the AI—enables the student to maintain autonomous writing ability by focusing their cognitive energy on higher-order argument construction rather than lower-level syntax errors.

A particularly novel finding is the significant indirect positive effects of perceived risks (RAIW) on writing outcomes through strategic use (AIGO and AIGL). While existing literature highlights concerns about risks like academic misconduct, over-dependence, and lack of clear guidelines (Afzal et al., 2025; Begum, 2025; Pum & Sok, 2024; Sok et al., 2025a; Sok & Heng, 2024b), our results suggest that students who are aware of these concerns are not discouraged from adoption. Instead, this risk awareness potentially drives more cautious and critical interaction. This phenomenon aligns with the concept of "shared agency" (Alm, 2024), where students actively engage in critical evaluation and strategic integration to preserve their language voice and control. Being aware of risks, such as the inaccuracies noted in scientific content (Kacena et al., 2024) or the risk of plagiarism (Kacena et al., 2024; Pum & Sok, 2024), likely compels students to use AI for scaffolding (grammar, ideas) rather than uncritically adopting output for content generation, thus facilitating the development of learner autonomy (Zulkefli & Ismail, 2025). The weak and non-significant role of perceived challenges and limitations (AICL) further suggests that while students acknowledge the difficulties of AI output (e.g., non-contextual outputs, lack of human interaction) (Sol et al., 2025b), these barriers are not substantial enough to block the positive momentum generated by trust and strategic application.

LIMITATIONS AND FUTURE RESEARCH

This study, while offering contextually rich insights, has certain limitations. First, a primary methodological limitation, the data relies on a self-report scale, which may introduce common method bias and may not perfectly capture actual writing performance or objective critical thinking gains. The SEM application, while providing a robust structural map of student perceptions, does not directly measure objective academic writing performance or linguistic accuracy. Consequently, the observed outcomes reflect the students' perceptions of their growth rather than verified pedagogical gains. Future research should integrate objective measures of writing quality, such as rubric scores or linguistic analysis of AI-assisted vs. non-assisted texts. Second, the cross-sectional design prevents establishing definitive causality. Longitudinal studies are needed to track how students' perceptions, usage strategies, and writing ability evolve over the course of a degree program. Finally, while the study focused on Cambodian undergraduates, its findings regarding the importance of strategic scaffolding may not be entirely generalizable to higher-resource educational systems. Comparative research across different socio-economic educational systems would further refine the generalizability of these findings.

CONCLUSION AND IMPLICATIONS

In conclusion, this study reaffirms the "dual-edged sword" analogy of AI adoption, demonstrating that the blade can be honed for positive educational outcomes when guided by positive perceptions and strategic use patterns. This study moves beyond the basic assumption that Generative AI assists writing by providing a nuanced, structural model of how and why this assistance occurs within Cambodian higher education. The findings demonstrate a "Strategic Mediation Effect"; specifically, that the frequency of AI use (FAIW) is a negligible predictor of success compared to strategic use patterns (AIGO and AIGL). Furthermore, the results reveal a "Risk Paradox" unique to this sample: while perceived risks (RAIW) are often feared as a deterrent to adoption, for Cambodian English majors, risk awareness catalyzes more cautious, strategic, and ultimately effective AI integration. This suggests that the "dual-edged sword" of AI can be safely balanced when institutional trust (AIBT) is high. These findings underscore the significant role of positive beliefs and trust in AI tools and strategic AI use practices (especially for idea generation and language enhancement) in enhancing Cambodian students' writing ability, confidence, and motivation. While this study centers on the Cambodian context, the findings offer a scalable model for Global South universities where resource constraints often necessitate the use of AI for cognitive scaffolding in English-medium instruction. By demonstrating that strategic usage patterns outweigh mere frequency of use, this research provides a framework for other developing nations to integrate generative AI into higher education in a way that prioritizes student motivation and writing confidence over basic automation.

The findings offer several actionable insights for university administrators, educators, and policymakers in Cambodia and similar developing contexts. Within the university, curriculum designers should integrate "Strategic AI Literacy" into English for academic purposes programs, rather than just an introductory workshop, because the mere frequency of AI use does not significantly improve writing outcomes. This "Strategic AI Literacy" should teach students how to use AI specifically for cognitive scaffolding, such as brainstorming complex outlines and refining linguistic nuances, rather than using it as a direct "answer machine." In addition, universities must also provide clear, transparent guidelines. These universities' academic integrity policy or guidelines should not rely solely on fear-based "anti-cheating" rhetoric, but rather, educators should foster critical AI consumption because students who perceive AI risks are still able to use the tools effectively for strategic writing. Teachers/educators play a significant role in encouraging a "human-in-the-loop" approach where students use AI as a critical partner rather than a total substitute, while openly discussing the risks of hallucinations, bias, and dependency on AI among their students. Teachers should also encourage the discussion about the benefits of AI integration in writing among the students since perceived benefits and trust were the strongest predictors of positive outcomes (motivation, confidence, and creativity). The institution should officially provide sanctioned AI tools or resource centers, because when students feel the institution supports responsible use, they are more likely to engage in the "purposeful application", which further leads to better writing outcomes. Finally, instructors should design assignments that incorporate AI in the pre-writing stages; for example, "AI-Augmented Outlining" assignments could be used to help students overcome writer's block, provided the final draft demonstrates the student's own critical synthesis and voice, as AI significantly enhances writing motivation and creativity in this sample.

DATA ACCESSIBILITY STATEMENT

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

SUSTAINABLE DEVELOPMENT GOALS (SDGs)

This study is linked to the following SDG(s): Quality education (SDG 4), Decent work and economic growth (SDG 8), and Industry, innovation and infrastructure (SDG 9).

ETHICS AND CONSENT

This study prioritized ethical data collection. The questionnaire's cover page ensured participants understood that their involvement was voluntary, they could withdraw at any time without explanation, and that submission of their responses constituted consent for the data's use in research and publication.

FUNDING INFORMATION

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

COMPETING INTERESTS

The author has no competing interests to declare.

AUTHOR CONTRIBUTIONS (CRediT)

Mengkorn Pum: Conceptualization, methodology, formal analysis, investigation, data curation, visualization, writing—original draft preparation, writing—review and editing. All authors have read and agreed to the published version of the manuscript.

AUTHOR AFFILIATIONS


Mengkorn Pum orcid.org/0009-0002-2740-2010
University of Management and Economics, Cambodia

REFERENCES

Afzal, M., Arshad, N., & **Shaheen, A.** (2025). ChatGPT and the future of academic writing: Enhancing productivity and creativity. *Journal of Engineering and Computational Intelligence Review*, *3*(1), 1–11. https://jecir.com/index.php/jecir/article/view/4

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

Algerafi, M. A., Zhou, Y., Alfadda, H., & **Wijaya, T. T.** (2023). Understanding the factors influencing higher education students' intention to adopt artificial intelligence-based robots. *IEEE Access*, *11*, 99752–99764. https://doi.org/10.1109/ACCESS.2023.3314499

Alharbi, W. (2023). AI in the foreign language classroom: A pedagogical overview of automated writing assistance tools. *Education Research International*, *2023*(1). https://doi.org/10.1155/2023/4253331

Aljuaid, H. (2024). The impact of artificial intelligence tools on academic writing instruction in higher education: A systematic review. *Arab World English Journal (AWEJ) Special Issue on ChatGPT*, 26–55. https://doi.org/10.24093/awej/ChatGPT.2

Alm, A. (2024). Exploring autonomy in the AI wilderness: Learner challenges and choices. *Education Sciences*, *14*(12). https://doi.org/10.3390/educsci14121369

Anjarani, S., Furqon, M., & **Rakhmawati, F.** (2024). ChatGPT to foster students' engagement in writing class: An intervention study. *Voices of English Language Education Society*, *8*(3). https://doi.org/10.29408/veles.v8i3.27687

Arowosegbe, A., Alqahtani, J. S., & **Oyelade, T.** (2024, October). Perception of generative AI use in UK higher education. *Frontiers in Education*, *9*. https://doi.org/10.3389/feduc.2024.1463208

Bachtiar, B. (2026). Personalized learning in distance education: The impact of AI-powered tools on engagement and self-regulation. *Open Praxis*, *18*(1), 146–165. https://doi.org/10.55982/openpraxis.18.1.925

Begum, S. (2025). AI and literature: The impact of artificial intelligence on creative writing and narrative forms. *Journal of Social Signs Review*, *3*(6), 180–199. https://socialsignsreivew.com/index.php/12/article/view/293

Bozkurt, A., Crompton, H., & **Kurban, C. F.** (2026). The devil is in the det [ai] ls: AI agents, ghost students, and the crisis of verified presence in an agentic AI world. *Open Praxis*, *18*(1). https://doi.org/10.55982/openpraxis.18.1.1145

Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.

Burkhard, M. (2022). Student perceptions of AI-powered writing tools: Towards individualized teaching strategies. In D. G. Sampson, D. Ifenthaler, & P. Isaías (Eds.), *19th International Conference on Cognition and Exploratory Learning in Digital Age CELDA 2022* (pp. 73–81). International Association for Development of the Information Society. https://files.eric.ed.gov/fulltext/ED626893.pdf

Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (3rd ed.). Routledge. https://doi.org/10.4324/9781315757421

Chenhuan, T., Yangqi, C., Hanbing, G., Zhuofan, L., Lijun, W., & **Yunye, Y.** (2024). A survey on AI-assisted creative writing research and practice. *Progress in Social Sciences*, *6*(3), 828–835. https://doi.org/10.35534/pss.0603077

Creswell, J. W., & **Creswell, J. D.** (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Deci, E. L., & **Ryan, R. M.** (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

DeVellis, R. F., & **Thorpe, C. T.** (2021). *Scale development: Theory and applications* (5th ed.). SAGE Publications.

Dillman, D. A., Smyth, J. D., & **Christian, L. M.** (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th ed.). Wiley. https://doi.org/10.1002/9781394260645

Eriyanti, R. W., & **Sunaryo, H.** (2025). Integration of artificial intelligence into creative writing learning models: A literature review of approaches and effectiveness. *International Journal of Community Engagement Payungi*, *5*(2), 201–220. https://doi.org/10.58879/ijcep.v5i2.77

Farahian, M., & **Rezaee, M.** (2025). Bridging technology and confidence: Linking AI acceptance to writing self-efficacy among English instructors. *Applied Linguistics Inquiry*, *3*(2), 95–110. https://doi.org/10.22077/ali.2025.9184.1127

Fornell, C., & **Larcker, D. F.** (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Fošner, A. (2024). University students' attitudes and perceptions towards AI tools: implications for sustainable educational practices. *Sustainability*, *16*(19). https://doi.org/10.3390/su16198668

Fraenkel, J. R., Wallen, N. E., & **Hyun, H. H.** (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill Education.

Ghimire, A., & **Edwards, J.** (2024, May). Generative AI adoption in the classroom: A contextual exploration using the Technology Acceptance Model (TAM) and the Innovation Diffusion Theory (IDT). In *2024 Intermountain Engineering, Technology, and Computing (IETC)* (pp. 129–134). IEEE. https://doi.org/10.1109/IETC61393.2024.10564292

Hair, J. F., Black, W. C., Babin, B. J., & **Anderson, R. E.** (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (Vol. 3). The Guilford Press.

Heng, K., & **Sol, K.** (2023). Cambodia's education system: New developments and persistent challenges. In K. Heng, K. Sol, S. Kaing, & S. Em (Eds.), *Innovations and challenges in Cambodian education: Youth's perspectives* (pp. 1–19). Cambodian Education Forum. https://cefcambodia.com/2023/09/18/cambodias-education-system-new-developments-and-persistent-challenges/

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

Hu, L. T., & **Bentler, P. M.** (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

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

Kanashina, O. (2026). Antecedents and fffects of ChatGPT usage: Insights into awareness, ethics, and plagiarism risks. *Open Praxis*, *18*(1). https://doi.org/10.55982/openpraxis.18.1.913

Khalifa, M., & **Albadawy, M.** (2024). Using artificial intelligence in academic writing and research: An essential productivity tool. *Computer Methods and Programs in Biomedicine Update*, *5*, 1–11. https://doi.org/10.1016/j.cmpbup.2024.100145

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Lee, Y. J., Davis, R. O., & **Lee, S. O.** (2024). University students' perceptions of artificial intelligence-based tools for English writing courses. *Online Journal of Communication and Media Technologies*, *14*(1). https://doi.org/10.30935/ojcmt/14195

Li, M., & **Wilson, J.** (2025). AI-integrated scaffolding to enhance agency and creativity in K-12 English language learners: A systematic review. *Information*, *16*(7), 519. https://doi.org/10.3390/info16070519

Marzuki, Widiati, U., Rusdin, D., Darwin, & **Indrawati, I.** (2023). The impact of AI writing tools on the content and organization of students' writing: EFL teachers' perspective. *Cogent Education*, *10*(2). https://doi.org/10.1080/2331186X.2023.2236469

MoEYS. (2022). *Education congress: The education, youth and sport performance in the academic year 2020–2021 and goals for the academic year 2021–2022*.

Monib, W. K., Qazi, A., Apong, R. A., Azizan, M. T., De Silva, L., & **Yassin, H.** (2024). Generative AI and future education: A review, theoretical validation, and authors' perspective on challenges and solutions. *PeerJ Computer Science*, *10*. https://doi.org/10.7717/peerj-cs.2105

Ngo, T. T. A. (2023). The perception by university students of the use of ChatGPT in education. *International Journal of Emerging Technologies in Learning (Online)*, *18*(17). https://doi.org/10.3991/ijet.v18i17.39019

O'Dea, X. (2024). Generative AI: Is it a paradigm shift for higher education? *Studies in Higher Education*, *49*(5), 811–816. https://doi.org/10.1080/03075079.2024.2332944

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

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), 1–15. https://doi.org/10.71176/interedtech/17573

Pum, M. (2026). The perceived impact of AI-assisted writing tools on writing autonomy, confidence, and creativity among Cambodian first-year university students: A Quantitative study. *Sage Open*, *16*(1). https://doi.org/10.1177/21582440251415304

Rabbianty, E. N., Azizah, S., & **Virdyna, N. K.** (2023). AI in academic writing: Assessing current usage and future implications, *INSANIA: Jurnal Pemikiran Alternatif Kependidikan, 28*(1a), 14–35. https://doi.org/10.24090/INSANIA.V28I1A.9278

Rad, H. S., Alipour, R., & **Jafarpour, A.** (2024). Using artificial intelligence to foster students' writing feedback literacy, engagement, and outcome: A case of Wordtune application. *Interactive Learning Environments*, *32*(9), 5020–5040. https://doi.org/10.1080/10494820.2023.2208170

Sedgwick, P. (2014). Cross-sectional studies: Advantages and disadvantages. *BMJ, 348*, 2276-2276. https://doi.org/10.1136/bmj.g2276

Silitonga, L. M., Hawanti, S., Aziez, F., Furqon, M., Zain, D. S. M., Anjarani, S., & **Wu, T. T.** (2023, August). The impact of AI chatbot-based learning on students' motivation in English writing classroom. In Y. M. Huang & T. Rocha (Eds.), *International conference on Innovative Technologies and Learning* (Vol. 14099, pp. 542–549). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-40113-8_53

Singh, S., & **Strzelecki, A.** (2026). Academics as adopters of generative AI: An application of diffusion of innovations theory. *Education and Information Technologies*, *31*(2), 621–645. https://doi.org/10.1007/s10639-025-13835-8

Sok S., & **Heng, K.** (2023). ChatGPT for education and research: A review of benefits and risks. *Cambodian Journal of Educational Research*, *3*(1), 110–121. https://doi.org/10.62037/cjer.2023.03.01.06

Sok S., & **Heng, K.** (2024a). Opportunities, challenges, and strategies for using ChatGPT in higher education: A literature review. *Journal of Digital Educational Technology*, *4*(1), 1–11. https://doi.org/10.30935/jdet/14027

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

Sok, S., & **Bunry, R.** (2023). Higher education in Cambodia. In L. P. Symaco & M. Hayden (Eds.), *International handbook on education in South East Asia* (pp. 1–24). Springer. https://doi.org/10.1007/978-981-16-8136-3_47-1

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. In M. S. Khine, L. Bognár, & E. Afari (Eds.), *Future of Learning with Large Language Models: Applications and Research in Education* (1st ed.). CRC Press. https://doi.org/10.1201/9781003567257-10

Sol K., & **Heng, K.** (2024). AI-powered chatbots as personalized academic writing assistants for nonnative English speakers. In M. A. Peters & R. Heraud (Eds.), *Encyclopedia of educational innovation* (pp. 1–5). Springer. https://doi.org/10.1007/978-981-13-2262-4_313-1

Sol, K., Heng, K., & **Sok, S.** (2025b). Using AI in English language learning: An exploration of Cambodian EFL university students' experiences and perceptions. *Journal of Science of Learning and Innovations*, *1*(aop), 1–32. https://doi.org/10.1163/29497736-bja00015

Sol K., Sok S., & **Heng, K.** (2025a). Rethinking assessment in higher education in the age of generative AI. In M. A. Peters & R. Heraud (Eds.), *Encyclopedia of educational innovation*. Springer, Singapore. https://doi.org/10.1007/978-981-13-2262-4_327-1

Song, C., & **Song, Y.** (2023). Enhancing academic writing skills and motivation: assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1260843

Sot, V., Sok, S., & **Dickinson, G.** (2019). Four decades of teacher development: Teacher preparation and teacher upgrading programs in Cambodia from 1979 to 2018. *Cambodia Education Review*, *3*(1), 115–139. https://cer.dopomoeys.com/wp-content/uploads/2021/10/7.Four-Decades-of-Teacher-Development-Teacher-Preparation-and-Teacher-Upgrading-Programs-in-Cambodia-from-1979-to-2018.pdf

Suciati, S., Silitonga, L. M., Wiyaka, Huang, C. Y., & **Anggara, A. A.** (2024). Enhancing engagement and motivation in English writing through AI: The impact of ChatGPT-supported collaborative learning. In Y. P. Cheng, M. Pedaste, E. Bardone, & Y. M. Huang (Eds.), *International Conference on Innovative Technologies and Learning* (Vol. 14786, pp. 205–214). Springer, Cham. https://doi.org/10.1007/978-3-031-65884-6_21

Sumakul, D. T. Y., Hamied, F. A., & **Sukyadi, D.** (2022, February). Students' perceptions of the use of AI in a writing class. In *67th TEFLIN international virtual conference & the 9th ICOELT 2021 (TEFLIN ICOELT 2021)* (pp. 52–57). Atlantis Press. https://doi.org/10.2991/assehr.k.220201.009

Tamilmani, K., Rana, N. P., Wamba, S. F., & **Dwivedi, R.** (2021). The extended Unified Theory of Acceptance and Use of Technology (UTAUT2): A systematic literature review and theory evaluation. *International Journal of Information Management*, *57*. https://doi.org/10.1016/j.ijinfomgt.2020.102269

Wang, S., Wang, F., Zhu, Z., Wang, J., Tran, T., & **Du, Z.** (2024). Artificial intelligence in education: A systematic literature review. *Expert Systems with Applications*, *252*. https://doi.org/10.1016/j.eswa.2024.124167

Xue, L., Rashid, A. M., & **Ouyang, S.** (2024). The Unified Theory of Acceptance and Use of Technology (UTAUT) in higher education: A systematic review. *Sage Open*, *14*(1). https://doi.org/10.1177/21582440241229570

Yeung, S. (2025). University students' engagement with generative AI-supported automated writing evaluation (AWE) feedback. *Journal of Second Language Writing*, *68*. https://doi.org/10.1016/j.jslw.2025.101203

Yusuf, A., Pervin, N., & **Román-González, M.** (2024). Generative AI and the future of higher education: a threat to academic integrity or reformation? Evidence from multicultural perspectives. *International Journal of Educational Technology in Higher Education*, *21*(1). https://doi.org/10.1186/s41239-024-00453-6

Zare, J., Madiseh, F. R., & **Derakhshan, A.** (2025). Generative AI and English essay writing: Exploring the role of ChatGPT in enhancing learners' task engagement. *Applied Linguistics*. https://doi.org/10.1093/applin/amaf045

Zulkefli, N. H., & **Ismail, H. H.** (2025). The impact of AI on ESL writing autonomy: A systematic review. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *10*(8), e003555. https://doi.org/10.47405/mjssh.v10i8.3555

TO CITE THIS ARTICLE:
Pum, M. (2026). The Dual-Edged Sword of Generative AI in Cambodian Higher Education: Modeling the Influence of Perceived Benefits and Risks on Strategic Writing Outcomes. *Open Praxis*, *18*(4), pp. 923–940. DOI: https://doi.org/10.55982/openpraxis.18.4.1084

Submitted: 06 December 2025
Accepted: 24 March 2026
Published: 05 October 2026

COPYRIGHT:
© 2026 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See https://creativecommons.org/licenses/by/4.0/.

Open Praxis is a peer-reviewed open access journal published by International Council for Open and Distance Education.