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AI-Powered Academic Writing: A Comprehensive Review and Conceptual Framework

Redacción Académica Potenciada por IA: Una Revisión Integral y Marco Conceptual

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Abstract: Artificial Intelligence (AI) has introduced a range of new tools and techniques for educators and students. This study critically reviews the literature on AI-powered writing tools, focusing on improving writing outcomes, the limitations of current integration methods, and the ethical issues that have remained largely unaddressed. The Technology Acceptance Model (TAM) is adopted as the framework for this study with its two main variables modified to focus on student engagement and academic writing proficiency and also extended to incorporate ethical issues in the adoption of AI-powered writing tools. The proposed conceptual framework provides a foundation for research in AI-powered tool integration in academic writing, with implications for adaptation into other educational contexts.

Keywords: Artificial intelligence; academic writing; ethical issues; technology acceptance model; human-centered AI.
Summary: Introduction. Review Approach. Literature Review. Conceptual Framework. Conclusion and Recommendations.

Resumen: La Inteligencia Artificial (IA) ha introducido una variedad de nuevas herramientas y técnicas para educadores y estudiantes. Este estudio realizó una revisión crítica de la literatura sobre herramientas de escritura impulsadas por IA, enfocándose en la mejora de los resultados de escritura, las limitaciones de los métodos actuales de integración y los problemas éticos que han quedado mayormente sin abordar. Se adoptó el Modelo de Aceptación Tecnológica (TAM), modificando sus dos variables principales para centrarse en el compromiso estudiantil y la competencia en escritura académica, y se amplió para incorporar cuestiones éticas en la adopción de herramientas de escritura impulsadas por IA. El marco conceptual propuesto proporcionó una base para la investigación sobre la integración de herramientas impulsadas por IA en la escritura académica, con implicaciones para su adaptación a otros contextos educativos.
Palabras clave: Inteligencia artificial; escritura académica; cuestiones éticas; modelo de aceptación de la tecnología; IA centrada en el ser humano.
Sumario: Introducción. Enfoque de la revisión. Revisión de la literatura. Marco conceptual. Conclusión y recomendaciones.

INTRODUCTION

Of the technologies that have upended society and the way we live, the advent of AI may have one of the most profound effects, in how it shifts the paradigms on our thinking, our actions, and interactions with others (Chen et al. 4). The focus of this paper is academic writing, where AI-powered writing tools have become key to learners' and educators' processes in academic second-language (L2) writing. These tools can help students and educators with text generation, editing, and suggestions for improvements. However, they generally do little to develop more abstract learning outcomes or teaching methods; these include academic integrity, independent research skills, or social support from peers. While AI tools are proliferating quickly through L2 classrooms, frameworks and guidelines on their correct and ethical use are also spreading at similar rates. This raises questions about both new and traditional methods.

In respect of this, this study employs a narrative and critical review to summarize and synthesize existing literature on the integration of AI tools into academic writing while still considering ethical guidelines. Academic writing is a significant skill for higher education students' scholarly exchange and in the development of critical thinking. Despite educational interventions, students often struggle with writing academically,

maintaining academic integrity, and properly disclosing and attributing the involvement of innovative technological platforms such as AI tools. Understanding the efficacy, ethical issues, and educational values of AI-assisted writing tools is imperative to enhance students' academic writing skills. This review aims to identify the key findings in the use of AI tools in academic writing. The following existing studies, in comparison, focused on the improvements in linguistic performance or the perceptions of the students.

For specific examples, Karyuatry found Grammarly helps reduce errors and boost quality (83). On more general outcomes, Zarei and Fabregas found that the integration of new technological tools in learning strategies could significantly increase students' participation and engagement through strategies like gamification (76–77). Tang (68) and Zhang et al. (2) both found success with using AI-supplemented methods when teaching Chinese EFL (English as a Foreign Language) or L2 learners, boosting their writing quality, efficiency, and sentence variety, among other benefits. Rahim and Gregory found that L2 students who were already familiar with AI tools achieved better writing outcomes in skill progression, writing quality, and proficiency as a result of the feedback they received (350). In a related fashion, regarding feedback, Zarei (56) and Khabib (114) found that AI tools provide learners with new ways to practice, receive criticism, and receive suggestions, acting as a convenient pair of second eyes.

Despite extensive research on their benefits and effectiveness, AI writing tools have also raised several ethical and pedagogical concerns: Barrot (43), Aljabr and Al-Ahdal (1), and Ugwu et al. (30) identified plagiarism, proper disclosure of AI use, and potential over-reliance on AI. Critical thinking skills may not be sufficiently developed if the students leave the proliferation of ideas and their development to the AI tool they are using. Similarly, Zhang et al. found that learners relying purely on AI feedback had very limited improvement in their critical thinking skills, while the hybrid group with traditional feedback did better in comparison through the addition of teacher or peer feedback alongside the automated, AI-powered feedback (4). Moorhouse et al. also found that language learners might lack critical awareness of how the tools function at all, even though they were also aware of the importance of responsible and transparent use (1). There are also more general concerns, such as AI tools producing incorrect citations, biases within the models, authorship rights,

confidentiality, and privacy arguments (Ateriya et al. 1; Barrot 50; Cheng et al. 7; Ersöz and Engin 1190; Rentier 3421).

These problems of plagiarism, bias, and hampered skill development are not insurmountable challenges, as the preceding studies show. Aljabr and Al-Ahdal (6), Wang and Dang (24), and Miao et al. (89) suggest strategies like using AI-powered plagiarism checkers, training students and educators on the proper and ethical use of the technology, and enacting disclosures for AI use in academic writing. Armstrong (102–03) and Ersöz and Engin (1190) advise wider-ranging, more comprehensive solutions such as new ethical frameworks, collaboration with stakeholders, and both institutional and global guidelines for AI use in academic work. In the expansion and integration of new AI-powered tools, the teachers' guidance may be most central. These problems can be solved by students learning and upholding the values of ethics, academic honesty, and transparency.

This study uses a narrative and critical literature review approach focused on investigating the integration of AI-assisted writing tools in academic writing and ethical and educational considerations. This method aims to provide a critical analysis and overview of patterns, key themes, conceptual gaps, and ongoing limitations within the field (Baumeister and Leary 311). The scholarly articles in the critical literature review were included if they tackled academic writing education with AI-assisted writing tools or included students' perceptions of them. They were also considered if they tackled broader concerns like the lack of frameworks or potential problems in student development with ethical concerns as a particular focus; inversely, studies were excluded if they were not relevant to L2 academic writing or were not specifically about technological integration in academic writing. The researchers primarily searched peer-reviewed journal articles via academic databases such as Scopus, Web of Science, and Google Scholar. This study's researchers collected and analyzed the findings on AI tools integration in academic writing, their pedagogical concerns, ethical issues, and perceived usefulness in L2 academic writing. The review was guided by a modified version of the TAM (Technology Acceptance Model), an information systems theory that models how users come to adopt a technology through the factors of Perceived Usefulness (U) and Perceived Ease-of-Use (E) (Davis 78). The modified model analyzes how academic writing proficiency, ethical issues, and academic integrity are discussed, framed, and conceptualized in existing literature. As a result of this process, a conceptual framework

was proposed to underpin the responsible and human-centered implementation of AI-assisted writing tools in academic writing.

2. Literature Review

2.1 Technology-enhanced Writing for Academic Writing

Much educational research has focused on AI-writing assistance for both L2 teachers and L2 students doing academic writing. The teachers can use the AI tools to paraphrase content in textbooks and create resources for the deconstruction phase in pedagogy (dos Santos et al. 1). Turkish English teachers found AI tools like ChatGPT flexible, engaging, and usable, though they found problems with inaccurate responses and the need for quality prompts (Kurt and Kurt 10). When it came to the students, who were English as a Second Language (ESL) L2 students from Hong Kong, the students already familiar with AI tools had better writing outcomes in both skill progression and writing quality (Rahim and Gregory 350), alongside more advanced abstract values, like time management and content generation skills (Hwang et al. 13). Particular applications included using ChatGPT as a "pseudo-teacher," a translation tool, and as a means of explaining words to students (Kohnke et al. 537). EFL L2 students from China found great success using traditional learning methods alongside AI tools, harnessing the technology to perform literature reviews, improve their grammar, and expand their sentence variety (Tang 74; Zhang et al. 17). Students from Saudi Arabia also ended up with richer vocabulary and learning using the AI tool Wordtune (Al Mahmud 1395). Wang and Dang found similar benefits for adult EFL L2 students, though they also found potential challenges like over-reliance on AI tools by students and also with the tools' cultural biases (1). It has been argued that learners might be using these AI tools without critical awareness of their functions and, more importantly, their limitations (Moorhouse 11). Still, the students did seem to understand the importance of responsible and transparent use, so we cannot say that they are totally blind or unaware of potential pitfalls. Overall, the studies show that AI tools are effective at improving language learning; their outputs have a variety of useful applications, like translations and additional feedback; and the tools may also benefit the students' confidence, critical thinking skills, and motivation.

The findings above do come with a caveat, in that most of the research on AI in language learning is focused on EFL undergraduate students, rather than ESL students (Feng et al. 1), alongside the under-representation of other demographics like younger K-12 students and non-English language learners (Wang and Dang 19). More studies on the subject are necessary, particularly when it comes to ESL students and the alignments and biases of most AI tools. Louro found that most AI models are based in the US, and about 90% of the training data for models is based on American English. This can cause unnecessary hardships for ESL learners, as their country's particular forms of English and their lexicons (such as the Indian English use of "prepone," an antonym of "postpone" that means to move up an appointed date or time) might be tagged as incorrect, causing confusion and friction in the classroom between the learners and their teachers. AI tools may also reduce the diversity of the various forms of English around the world and remove the distinctions between EFL and ESL for the worse, as AI tools push only one form of Western-focused English as the "correct" one. AI tools also have several other readily apparent pitfalls, as will be shown in the next section.

2.2 Ethical Considerations in AI-integrated Academic Writing

Regarding the challenges of AI writing tools in academic writing, this study also focuses on ethical and pedagogical concerns. Some of the studies reviewed mention the need for responsible use, over-reliance on the tools, and the hampering of important skills as a result (Moorhouse et al. 1; Wang and Dang 24). Mwita and Mwilongo specifically examined ethical and unethical practices in the use of AI in academic writing (17). The applications that were identified as ethical uses of AI included brainstorming, applying theories, reading AI-generated concepts, editing, data analysis, and translation. A partial list of issues that could be considered unethical use included the failure to acknowledge AI use as well as potential data manipulation. Ateriya et al. conducted a similar study; they found AI is an effective tool for academic writing, but it still has the previously mentioned problems of transparency and plagiarism. They also added publication problems like authorship rights, potentially inaccurate citations, problems around proper protocol, justice, the question of human control, and research ethics (7). Rentier took a quantitative approach focusing on AI tools as statistical models and found that they are both powerful as well as being a source of ethical concerns (3421),

including risks to validity, accuracy, fairness, transparency, bias, and reflective conversations. Hence, he advised openness about the use of AI tools and constructive debate on such a critical topic.

Inevitably, these debates and studies also discuss possible solutions or approaches to solve these issues. Ugwu et al. found that AI tools are helpful for research writing, but the previously mentioned concerns like plagiarism, transparency, and bias make following ethical guidelines and maintaining academic integrity essential (30). Armstrong focused particularly on that latter point, calling for new ethical frameworks, collaboration with stakeholders, and institutional policies to promote responsible AI use in academic writing (100–01). Ersöz and Engin echoed this pressing need for global guidelines on AI usage in academia, after conducting a case study among 34 researchers who, while believing that AI is a useful tool with much potential, still had questions over ownership and citation accuracy (1190).

Cheng et al. proposed some guidelines and principles for use, centered on the ethical principles of human oversight, meaningful contribution, accountability, fact-checking, and moral evaluation (7–8). AlSamhori and Alnaimat proposed that human authors must be made ultimately responsible for ensuring the originality, honesty, and accuracy of their work (259). Similarly, Jarrah et al. claimed that LLMs such as ChatGPT do not invite plagiarism in academics, so long as human writers attribute the contributions of the model and do their due diligence, checking all citations, rather than just blindly trusting the machine's output (1). However, Sallam discusses how ChatGPT was, as of January 2023, unable to be credited as an author in academic research, barring any major rule shifts (17). The authors cannot predict the future, but the trends around the integration of AI into several aspects of life beyond academic work suggest that serious talks around these changes are likely.

For all the apprehension surrounding this new technology and the many novel problems it brings, a common theme is the traditional, age-old solution: students and academic writers need human educators to teach them about these ethical issues, and to imbue them with the importance of transparency, academic integrity, and proper attribution. Teachers must encourage this by ensuring open communication and honesty, so students do not feel the need to hide potential dishonesty with AI tools (Qasem 30). As much as the fears and the studies center around ChatGPT and other AI tools, and how advanced the technology is, they are not autonomous agents and require a human user to prompt them first.

2.3 Pedagogical Issues and Classroom Implementation

Moving beyond the ethics around AI tools, there are also problems when it comes to classroom implementation. The most significant of these is that, as powerful as AI tools are, they should be used as a ladder to bridge gaps, and not an elevator allowing the users to skip all the work and the implementation of skills they would have developed by climbing. Again, Zhang et al. (17) and Moorhouse et al. (11) find that an unsupervised, supplemented AI tool may lead to students failing to develop critical thinking skills and critical awareness of the tool's capabilities. There are also studies like dos Santos et al. (6), Kim et al. (79), and Yan (13943) which focus on issues surrounding the latter problem, such as the tools' ability to produce incorrect information without citation, their susceptibility to bias, the limits around the depth and scope of the feedback these tools can provide, and even the concern and reluctance of students themselves towards AI tools. Without proper knowledge and training for both students and educators, the many benefits of AI in language learning may be lost or at least severely hampered (Wang and Dang 24; Miao et al. 95–96; Barrot 46–47; Aljabr and Al-Ahdal 5).

On this same level of classroom implementation, there is the need to figure out exactly how AI can fit into classroom lesson plans, especially if students and/or educators are unfamiliar with or ignorant of what AI can do and how it works, exactly. Aljabr and Al-Ahdal argue that there must also be regulated learning environments and revised assessments taking AI-integration into account (5). Educators must assess how much the use of AI is helping the student when they have begun to offload most, if not all of the work, onto the machine beyond thinking of and tweaking the prompts to feed it, and of course, avoiding the other pitfalls of AI-use like plagiarism. With proper ethics, supervision, and always remembering the humans in the center of it all, AI tools can be an effective supplement to, rather than replacement of, conventional writing instruction (Tang 68; Kurt and Kurt 14; Zhang et al. 1). If used with care, AI-powered writing tools can help educators boost students' engagement, help design writing assignments, and improve the quality, specificity, and speed of the feedback and evaluation process of students' work (Sims; Nazari et al. 2). And of course, it bears repeating for how central it is to the findings: AI-assisted tools must remain tools, not replacements to teachers, as the AI tools alone cannot address all the needs and dimensions of L2 education.

With how dramatically the integration of AI-powered writing tools can affect language learning and come with new, innovative problems, a much more specific lens must be taken. To begin with, there is students' digital literacy and familiarity with AI tools. Inevitably, some students will adopt the new tools easily and can effectively make use of them, while others might struggle to even begin to write their first prompt. Combined, these can potentially worsen existing inequities in learning outcomes, giving yet more advantages to technologically savvy students. Educators need to ensure that there is appropriate guidance for students at every competency level, particularly those at the lower end of digital literacy, to ensure equitable distribution of AI tools' benefits.

Yet another set of concerns is the contextual and cultural factors around the creation of AI tools. Most of them are trained on Western English datasets, which can cause problems with underrepresented cultural conventions, local academic norms, and variations in regional dialects. Louro mentions the Indian English word "prepone," used as the antonym of "postpone." She also mentions how Singapore English has mixed elements from Malay, Tamil, and Hokkien, which majority-Western-based models might be unable to recognize. EFL and ESL students may be given suggestions by the AI tools that are considered "incorrect" in US English but are perfectly acceptable within their educational system or cultural expectations. Such misalignment would likely lead to unnecessary doubt, disagreements with their teachers and the AI, and potential overreliance on the AI's suggestions. This could lead students to refrain from or be unfairly penalized for using culturally specific expressions, narrowing English's linguistic diversity. As has been mentioned by studies like Tang (74) and Zhang et al. (17), AI tools are best used as a supplement to traditional language learning rather than a replacement, especially as human beings have much more lexical diversity and contextual understanding than AI tools.

Moving beyond language learning and improved writing, there are also more abstract, general educational goals like the students' cognitive and ethical development, and emotional growth (Tang 74, Zhang et al. 17). AI tools excel at helping students create content, correct their grammar, and tune and improve their structure; however, they cannot help them develop critical thinking, moral judgment, or ethical discernment. Should students become too dependent on taking the AI tools' suggestions, it may result in writing and articles that are technically perfect but lack substance and critical reasoning (Moorhouse 8). In the most catastrophic scenarios,

dependence on AI tools may result in a future where researchers feel they cannot work at all without AI tools, or result in work by academics or researchers that has been entirely or near-entirely AI-generated. To prevent these scenarios, the integration of AI tools must be paired with lessons and practices to strengthen these meta-cognitive skills, encourage reflection and assessment without the AI, and maintain accountability for original writing (Tang 72). Assignments should have students explicitly evaluate AI-generated outputs to see where these tools excel and fall short. Students should also critically think about their revisions and the AI tools' suggested changes to help justify their writing choices beyond trusting the AI tools' output. Should the AI tools be unavailable, explicitly banned by a publication, or just unfit for a task, the students should ideally rely on their own skills (Dolba et al. 2). The denial or inaccessibility of AI tools should not put students at a severe disadvantage.

Finally, moving to a larger scale than the teachers and the students in the classrooms, institutions must also provide support for sustainable and responsible AI tool integration (Dolba et al. 6). There must be clear and well-crafted frameworks and policies for acceptable use, attribution, and transparency of use. Without rules, guidance, and guardrails, students may accidentally engage in unethical practices like plagiarism and misattribution of sources; meanwhile, educators may struggle to assess their outputs, as it is unclear how much of any given work is the work of the student versus AI tools (Braganza-Valera 69–70). Blanket assumptions that AI is always used might damage students who choose not to or are unable to use AI tools. Those students may feel pressured that they must find a way to use AI tools in order to keep up, or that the personal efforts and struggles to avoid using AI are ultimately worthless. Professional educators must also be able to use the AI tools themselves, competently advise the students in their use, and balance the benefits of new technological assistance and the timeless need for honesty, transparency, and attribution (Moorhouse 11).

As powerful and simple to use as AI tools can be, they are clearly not a swift or uncomplicated solution to improving language learning. There are many interlocking factors—digital literacy, cultural and contextual alignment, cognitive and ethical development, and institutional support—that must be thoroughly and responsibly addressed to maximize benefits while minimizing harms (Moorhouse 11; Zhang et al. 13). As has been mentioned before, AI tools are best as a supplement, not a replacement for traditional learning; on the same note, students must learn to use them as a

tool to enhance their writing and education, rather than a shortcut that does all the work for them. If the point was to produce reams of elegantly written and extensive writing, the AI tools could have already produced such text. However, this study's researchers believe that the goal is to produce well-rounded, competent, and ethical professionals.

3. THE TAM MODEL FOR AI-POWERED WRITING

Davis first developed the Technology Acceptance Model (TAM) to help understand why users would choose to integrate new technology into their lives (2). He found that integration is chiefly based on the technology's utility, a factor directly shaped by various influences, and which also indirectly affects the user's attitude and willingness to use it (78). The first of the TAM's two concepts is perceived usefulness, where the users believe using the technology will enhance their performance. The second is ease of use, involving factors like how understandable and/or flexible the technology is. The original TAM model has seen many changes and evolutions over the years, as documented by Tang and Chen (588). After the original TAM, there was the Extension of Technology Acceptance Model (TAM2) by Venkatesh and Davis (qtd. in Chen 589), the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (qtd. in Chen 589), and the Technology Acceptance Model 3 (TAM 3) by Venkatesh and Bala (qtd. in Chen 590). These evolutions tended to explore and add more factors around use, and to make them more adaptable to other contexts (589), including social influences, cognitive instrumental processes, facilitating conditions, individual differences, and system characteristics (589–90). Venkatesh has already done research on the adoption of AI tools; however, it was using his UTAUT rather than the original TAM, and in the context of operations management rather than education (2). However, the TAM variants/successors have been applied in studies; Xiao et al. used the TAM3 to study Chinese students' adoption of AI (15–16); and Acosta-Enriquez et al. used another variant, UTAUT2, to study AI tools' acceptance in universities across the globe (10-11). Like in sections 2.2 and 2.3 above, they find AI tools have potential ethical issues, privacy concerns, and a lack of linguistic support for students' native languages, which tended to be categorized under the TAM variants' social influence factor or the facilitating conditions.

Despite these variants and expansions of studied factors, however, the original TAM still has relevance. Rahim and Gregory used it in their 2025

study of L2 students, particularly when understanding the students' eagerness to integrate it into their workflows because of how useful it seems to them (354). Thus, the researchers believe that a modification of the original model can still be useful as a conceptual framework to understand the key metrics and methods for assessing L2 students' writing skills and other learning outcomes.

3.1 Key Aspects of the TAM Model for AI-Powered Writing

3.1.1 Student engagement

Several studies have already found that students themselves have a positive engagement and strong desire to continue using AI-powered writing tools, even without educational institutions and educators encouraging them (Rahim and Gregory 350; Hwang et al. 13). Furthermore, Moorhouse et al. showed that they may lack critical knowledge about AI tools' uses, leading to potential negative outcomes (1). Many students are already leaning towards using AI-assisted writing tools, so the authors of this paper believe it is imperative to understand their use. Specific metrics can include the frequency of AI use, for how long it is used for each given time, and students' perception of how much it improves their writing—that is, the perceived usefulness.

3.1.2 Writing Proficiency

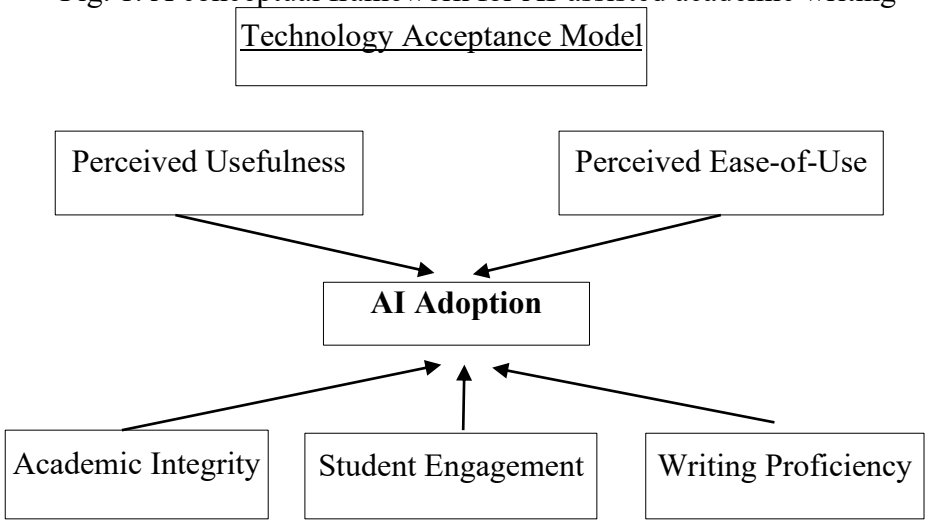
The review has also shown that the usefulness is not just in the eyes of the students; educators and researchers are finding that AI-powered writing tools have measurable positive effects on the students' writing skills and confidence (Rahim and Gregory 350; Tang 69; Wang and Dang 24; Zhang et al. 17). The researchers believe this cannot be overlooked, as with the first key variable alone, the integration of AI-powered writing tools may just seem like acquiescing to the desires of students to make their learning easier for no other benefits. Even educators can benefit greatly from AI tools by covering the blind spots of AI tools' automated feedback and proving their continued relevance in education (Kurt and Kurt 10).

3.1.3 Academic integrity

For all the notable effectiveness and widespread eagerness to adopt AI-assisted writing tools in academic writing, their ethical and pedagogical pitfalls must be addressed. As mentioned in 2.2 and 2.3 of the literature review, even those studies that speak positively about the benefits and effectiveness of AI tools in academic writing, mention myriad potential problems (Moorhouse 11; Mwita and Mwilonogo 17; Wang and Dang 14; Zhang et al. 1). Hence, as Armstrong (100-1) and Xiao et al. (15) call for, the TAM Model for AI Writing framework helps guide students, learners, and researchers around these ethical issues (15).

With all key factors explained, Fig. 1 presents a revised Technology Acceptance Model (TAM) that integrates and highlights these three core pillars. Previous research on AI writing tools often concentrated on one or two aspects, such as student engagement or writing proficiency, creating gaps in how these tools are understood beyond experimental settings and into everyday classrooms. In contrast, our approach offers a holistic framework for evaluating AI writing tools in education, assessing them not only in terms of practical use but also in their impact on essential human dimensions—such as ethical reasoning and academic integrity. If the aim were merely to produce voluminous and polished texts, modern LLMs like ChatGPT might suffice, relegating students to mere prompt creators. Yet, academic writing must cultivate generations of scholars who express themselves effectively and ethically. In this light, AI tools alone cannot achieve these goals; they fall short in nurturing critical thinking and moral judgment.

Fig. 1. A conceptual framework for AI-assisted academic writing



Source: Prepared by the author

3.2 Contribution of the Study and the TAM Model for AI-Powered Writing Framework

Most studies have focused on AI after it has already been adopted, on studying the consequences of its adoption, or measuring the acceptance of AI tools by the students and teachers (Acosta-Enriquez et al. 10–11; Al Mahmud 1395; Kurt and Kurt 14; Moorhouse et al. 11; Tang 68; Xiao et al. 15-16; Zhang et al. 17). Scholars rarely focused on the adoption and integration process, particularly when there are infrastructure or cultural concerns like lack of native linguistic support (Acosta-Enriquez et al. 10–11; Xiao et al. 15–16). Few studies have focused on the integration process of AI-tools; within this review, there are four: Na et al. focused on its use in the construction industry (2); Cui studied the emotional motivations for students' adoption of AI tools (10); Nugroho and Wulandari used the TAM to understand EFL students' willingness to adopt AI-powered writing tools (ChatGPT particularly) into their workflow (82); and Du et al. studied AI-powered writing tools' adoption in education systems, specifically in Vietnam (13). Another trend this study finds is that few studies focus on the potential academic integrity concerns with AI-powered tool adoption in academic writing, and what unfolds following the implementation of AI. Writing outcomes and student engagement/enthusiasm are often measured, but few have tackled the potential ethical issues, privacy

concerns, and possible negative effects to abstract learning outcomes, such as developing academic integrity (Moorhouse et al. 9; Xiao et al. 15-16; Zhang et al. 17). Thus, the researchers proposed this expanded version of the original TAM as a framework to measure student engagement, writing proficiency, and academic integrity as a framework to study AI tool implementation and its aftereffects. Initial promising results, student enthusiasm, and improved writing outputs cannot be the only basis for adoption. Elements of traditional education must also be considered and integrated with them rather than replaced. This is especially so as Tang (74) and Zhang et al. (11–12) found that AI-assisted writing tools are best used as a complement to traditional education, not a replacement, and both teachers and students should have the prerequisite skills to use them to their full potential.

This framework primarily reduces complex relationships between AI technology and its effects on L2 language learners' outcomes to the three key points mentioned: student engagement, writing proficiency, and academic integrity. External factors, such as the material costs of integrating AI into the curriculum and broader factors like political will and support, are left unaddressed. The intersection is only intended to help analyze AI-assisted writing tools in academic learning and may have limited application to other fields outside of this. Should these broader factors, like facilitating conditions or social factors, be necessary, frameworks based on variants like the UTAUT, TAM2, or TAM3 may be used instead (Tang and Chen 590; Venkatesh 2).

CONCLUSION AND RECOMMENDATIONS

This study discussed how AI-assisted writing tools appear to generally improve students' writing skills while also posing risks if utilized irresponsibly. It highlights the need for a well-rounded approach beyond writing skill metrics. This research contributes to the education field by putting forward a conceptual framework to understand the key concepts influencing the adoption of AI-powered writing tools in academic writing. Previous studies had only spotlighted AI's usability or limited their scope to merely academic writing outcomes. With the novel pillar of addressing ethical issues, the present study shines a light on an understudied aspect of the present literature. The framework provides a conceptual understanding of AI-assisted tools for integration into academic writing, with humans and machines working seamlessly together.

Many of the recent shifts in academic writing education attempt to incorporate AI tools into lessons to improve teaching techniques and make students' learning more efficient. Like with any new technology, especially one as generalized as AI, educators need to be aware of the potential pitfalls and downsides, like intentional and accidental breaches of academic integrity or the biases in AI tools. Teachers can use such technologies to craft creative learning plans, better address students' personal needs, and help mitigate systemic problems. They can learn how to help students with special needs. Students themselves can use AI tools to enhance editing and proofreading, exploring ideas and directions, and developing skills like grammar, syntax, and style, if used alongside traditional schooling and their teachers' guidance. There are also broad implications stemming from AI tools' flexibility and success in non-Western cultures such as China, Turkey, and Saudi Arabia, despite the current US dominance in models and training data. As potentially massive and enticing as the benefits are, however, ethical application is key. Thus, AI writing tools should be applied surgically, with much thought and even more planning. Continuous research and review will help improve understanding of how AI tools affect students' academic writing, and future research can find more specific, actionable plans for such integration. Focuses might be on adapting Western models to non-Western contexts to reduce bias, specific training for educators to understand what sort of biases AI tools tend to have, or even the development of AI tool branches better suited for forms of education, like L2 language learning in Non-Western countries. Collaboration opportunities between researchers, technology developers, educators, and other stakeholders also abound, as AI has touched so many aspects of society beyond academic writing.

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