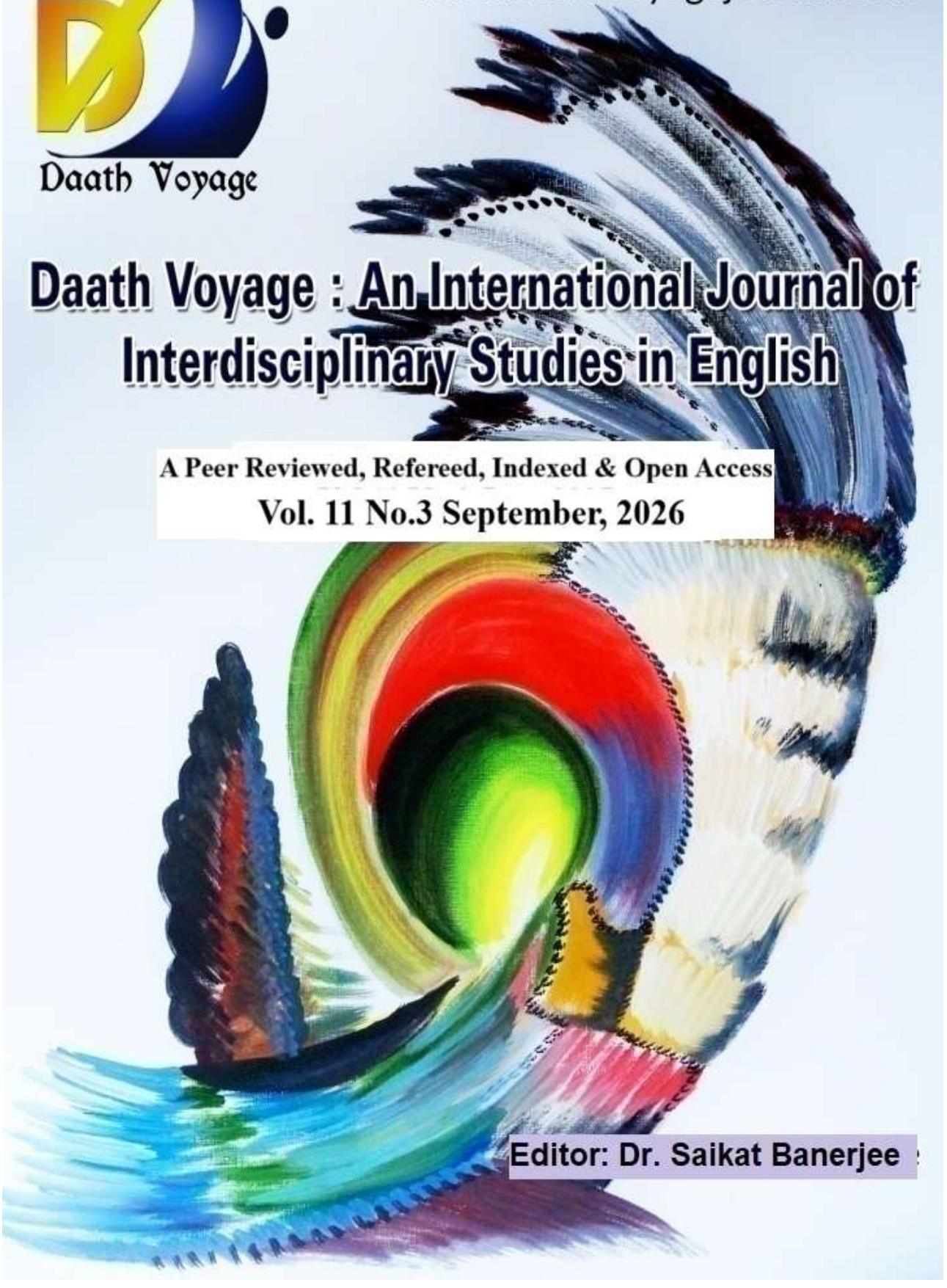
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Creativity, Cognitive Load, and Writing Confidence in Generative AI–mediated EFL Academic Writing

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Abstract: The fast integration of the technology of generative AI in academic writing in English at the college level for students of EFL who use this technology in their writing should be noted. The process of human-AI mediated writing involves not only the acceleration of writing processes but also a transformation in the very nature of students' experience of writing. The present study provides a conceptual review of three constructs associated with AI-mediated academic writing: creativity, cognitive load, and writing confidence. Based on the empirical and review literature on the topics of AI-supported L2 writing, human-AI collaboration, and affect in writing, this paper introduces a conceptual model in which AI serves as a moderator variable between these constructs. The model illustrates the paths through which the use of AI technologies would enable creativity, reduce language-based cognitive load, and boost confidence in writing, and, conversely, the paths through which the overuse of AI would result in the loss of creativity, increased cognitive load, and lowered self-efficacy. In essence, the paper offers valuable recommendations for teachers, who are encouraged to see AI not as a means for achieving quick results but as a creative collaborator, which would foster writing independence and creative thinking of students.

Keywords: Generative AI; EFL academic writing; creativity; cognitive load; writing confidence.

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Introduction

Learning how to write in academic English is a challenging process for non-native speakers. Academic writing involves generating ideas, forming arguments, and incorporating sources simultaneously while maintaining linguistic accuracy and an academic tone. Thus, in the case of an EFL environment at the university level, apart from facing problems related to grammar and vocabulary, learners must ensure that they achieve cohesion, disciplinary conventions, and an academic voice in their writing.

With the rise of generative artificial intelligence, all this is about to change. Writing assistants in the form of ChatGPT, Grammarly, and other similar applications help students generate ideas, structure texts, paraphrase them, proofread, translate, and edit their writing. Currently, AI has become an accepted practice in many colleges when it comes to writing. Empirical studies confirm that EFL students use generative AI for idea generation, polishing, and editing texts on the surface level, and "preferred AI as a complement to, rather than a replacement for traditional instruction" (Lee et al.1). This rise of AI technologies takes place amid broader trends in assessment, where increasing pressure on students to publish, to submit coursework, and to conduct research at early stages of study plays a significant role.
Both benefits and drawbacks exist with respect to these emerging opportunities. From an educational standpoint, using AI can alleviate the sense of intimidation and motivate students to begin drafting. Instant feedback is provided through AI software concerning the learner's writing style and grammar usage, thus making them feel more comfortable by eliminating the fear of making any errors. Actually, it has been scientifically proved that the constant use of AI-based feedback can improve EFL learners' "writing proficiency, revision practices, and writing quality" (Mekheimer).In addition, AI-based software provides specific templates and vocabularies for learners.

But there are some concerns that come up with the use of AI technologies, and these include dependency and superficiality. Students tend to accept the information generated by AI without questioning it in any way and mistake linguistic fluency for reasoning. In this situation, the unique voice, language, and reasoning abilities of the students get overshadowed by the generated text. Because of the over-use of AI, one cannot differentiate if technology is operating as support in guided and reflective teaching or as an end in itself by taking the place of human writing instruction.

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There are three constructs that are particularly significant in this study: creativity, cognitive load, and writing confidence. Creativity is considered to be the ability to conceive and produce novel ideas in a manner that will fit the academic setting. It requires idea production as well as problem formulation, source combination, and argumentation. The definition of cognitive load is the amount of mental effort that is involved in writing. In this particular case, although there are three different types of cognitive loads – intrinsic, extraneous, and germane, the cognitive load theory has been revised in order to fit human-AI collaboration, including four aspects of the cognitive load: "(1) Prompt Management, (2) Critical Evaluation, (3) Integrative Synthesis, and (4) Authorial Core Processing" (Yao and Fan 1).

The purpose of the current research paper is to provide some understanding about the theoretical framework of the impact of Generative Artificial Intelligence on academic writing in English as a Foreign Language (EFL) in terms of creativity, cognitive load, and writing self-efficacy. The paper presents a theoretical overview of contemporary research studies and scoping reviews on topics connected with AI assistance in writing, collaboration between humans and AI, and language learning using technological means. The main hypothesis of this paper aligns with Zhou et al., who note that while most studies aim to improve writing, future research must prioritize ethical "AI literacy" to ensure sustainable and equitable classroom implementation (95).

From the scoping literature review conducted on the application of AI in helping English writing, it is evident that the bulk of the research papers written after 2020 are mainly focused on EFL and ESL settings, where instructors and students employ various feedback tools, generative writing aids, and human-computer collaboration. Within the research, the main emphasis is made on writing performance, motivation, and behaviour, and not on psychological and cognitive aspects. Another scoping review specifically focusing on ChatGPT-based writing instruction in EFL education highlights the influence of AI-powered tools on student "academic writing" (Selim 14).

Past research has indicated that there was short-term improvement in writing skills using artificial intelligence in the classroom setting. As pointed out by the researchers in one study, students at the university level who were learning English as a foreign language have also used AI. The aspects that can be considered include idea generation, editing, and improving language skills. It has been found that AI is a highly effective supplementary tool for EFL writers, especially for idea generation and "content refinement" (Lee et al. 1), though students still prefer human judgment and feedback from their teacher.

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In the quasi-experimental research where the students received feedback concerning their grammar and organization skills through AI-based tools such as Grammarly, improvements in writing proficiency, revision strategies, and writing quality have been witnessed (Mekheimer).

Collaboration between humans and AI has been identified as a separate field of research. Research conducted on the writing process carried out by PhD students who collaborate with AI-driven applications found that the interaction between humans and AI is very important. More specifically, it was found that PhD students who collaborate in an iterative manner with the GAI-driven application perform better at the task compared to those who take a linear approach and "use GAI merely as a supplementary information source" tend to get lower performance **(**Nguyen et al. 847). That is, the use of AI becomes especially efficient when it is incorporated into the decision-making and reflection processes of humans, and not just used as a tool for generating text. Collaboration between humans and artificial intelligence in providing feedback on English as a Foreign Language (EFL) writing has shown that although students consider automated feedback to be faster and more specific about such local elements as grammar and vocabulary, they still deeply value instructor feedback in relation to global issues like argumentation. There is also empirical evidence that **"**s**"** is highly valued by EFL learners, leading to measurable improvements in their writing accuracy, complexity, and fluency (Bai and Nordin 1).

Furthermore, the key notion of cognitive load should be thoroughly analysed in relation to the writing process mediated by AI. The absence of generative AI implies that second-language writing imposes high demands on a learner’s working memory because writers should juggle their ideas, grammar, vocabulary, and discourse at the same time. But, with the advent of generative AI, this gets slightly altered. In fact, by considering the empirical evidence of the reliability of the Cognitive Load Scale of AI-Assisted L2 Writing, certain unique types of cognitive load can be pinpointed here, which are measured through four separate factors: (1) Prompt Management, (2) Critical Evaluation, (3) Integrative Synthesis, and (4) Authorial Core Processing (Yao and Fan 1). As the authors point out, while generative AI relieves some of the inherent cognitive load related to language mechanics, it adds extraneous and germane loads because of the necessity to interact with the interface and evaluate recommendations. In other words, it turns out that "working memory" is still a critically important concept regardless of the use of sophisticated digital tools (Deng 2).

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Although there have been a number of studies that have tried to establish connections between such topics as writing quality, lexical errors, and learner perception, it is quite difficult to clearly establish connections between these findings and key constructs. Moreover, the majority of existing research focuses on isolated dimensions, such as feedback efficacy or academic integrity, showing that research on psychological and cognitive aspects is " frequently limited " (Zhou et al. 95). Finally, generative AI is frequently dichotomized as either a writing facilitator or an academic integrity threat, largely overlooking how its integration fundamentally transforms students' perceptions of the writing process and their long-term development as writers.

Conceptual Framework

Creativity

The application of artificial intelligence may encourage creativity as well. The technology can help with the commencement of the writing process through providing topic ideas, structures, and keywords, especially for EFL students who have trouble initiating their writing as these learners frequently adopt these tools; indeed, most studies in this field seek to enhance writing performance and learner motivation using artificial intelligence technologies. Moreover, it helps in brainstorming and experimentation with different ideas. Nevertheless, in academic writing, creativity is not limited to idea generation only. The ability to choose, develop, and connect ideas to create an argument in a certain subject area is required as well. As for creativity, AI has both a positive and negative impact on it. On the one hand, it may be used to provide alternative outlines or formulations and thereby help learners understand connections between concepts and experiment with essay structures. On the other hand, it may prevent learners from forming their own opinions due to " overreliance on AI" (Shabir 543).

AI can also stifle creativity. When learners depend only on AI wording without conducting any analysis, they are likely to end up with fluent yet very standardized texts. These texts are likely to be accurate, but lack any creativity. Creativity in academic writing is more than **t**extual polishing of the text; it is a method through which the learner expresses himself or herself. This can become difficult when the computer does all this work, standardizing the student's output since these systems act as a mechanism "standardizing academic practices" (Gretzky and Dishon 338). Qualitative studies show that some learners view the machine-written part of their essay as the best part.

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In order for AI-assisted creativity to be pedagogically valuable, it has to be recognized as a dialogical activity rather than mere text generation. The assignment should involve a critique of AI recommendations and an explanation of the reasons behind accepting, rejecting, or modifying them. In this way, Generative AI can become a companion of a writer: it provides prompts, and the human decides what form argumentation will take, turning the human-AI collaboration into "iterative, highly interactive processes" (Nguyen et al. 847).

Cognitive Load

AI impacts cognitive load, which is diminished by the reduction of the effort connected to grammar, vocabulary, and sentence structuring. On the contrary, generative systems might engender unique cognitive demands that might become the basis of a scale for unique cognitive demands in human and artificial intelligence collaboration on writing tasks. Under such situations, the students will have to decide on which prompts to employ, analyse responses, and then edit these responses. The cognitive load theory is comprised of three types of loads. They include intrinsic, extraneous, and germane loads. The intrinsic load is the level of complexity involved in performing the given task. This could be understanding theoretical knowledge through literature review. Extraneous load is due to the bad design of the instruction or interface that diverts attention from the primary goal of learning. Finally, germane load is about the productive effort of students in creating new schemata and strategies. When generative AI is applied to EFL writing, the amount of intrinsic load connected to linguistic form is decreased.

The proficiency level of the writer is another important issue. EFL students who are skilled writers and who have become proficient in many linguistic structures are more inclined to understand AI's function as a technology that assists them in focusing on rhetoric. In case of novices, however, this line can become blurred leading to "blurring the boundaries of human and machine knowledge production" (Gretzky and Dishon 338). This means that one cannot determine whether they comprehend the language structures involved. Here, the cognitive load involved in controlling the AI comes into play, leading to mental overload since learners will be controlling something that is smarter than they are.

Writing Confidence

There have been cases where AI has increased students' confidence in writing in certain situations. Students will always be more confident when assisted by AI to write the first draft of their work. This will make them get over their fear of making mistakes, knowing the positive effects that AI technology is likely

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to bring to their work. This is beneficial for them in the EFL setting where they are likely to be afraid of making any mistakes.

But confidence in this case can be fragile and volatile if the students depend much on AI for doing the writing. Confidence in this case should be achieved by developing skills by the learner, and not by just getting help from machines. According to qualitative research carried out in an EFL setting, dependence on AI without any clear guidance from the institution can make students feel guilty and confused. A writer who depends heavily on technology may rely on it to justify their work, thereby impacting their writer identity—especially when the "Algorithmic-Author" functions not merely as a writing tool but as a mechanism standardizing academic practices (Gretzky and Dishon 338).

Confidence in writing is multifaceted. As much as one is sure of their capability to achieve a particular task using AI, they lack confidence in their capacity to write on their own in the future in exams or even at work. In this case, confidence in performing the task improves, but self-efficacy remains low. Confidence is sustained when learners are convinced that success is a product of their efforts alone. When students think that success is only achieved through AI, they lack confidence in themselves, particularly when relying on systems that threaten "academic integrity" (Evangelista 1).

Analysis of the Three Constructs

The papers examined in this study imply a conceptual model where AI's effect on the academic writing of EFL learners is realized via three constructs: creativity, cognitive load, and writing confidence. In cases where the use of AI lowers language-related cognitive load and assists in generating ideas, the attention of the students can be focused on developing arguments and incorporating sources, resulting in increased creativity and self-efficacy. In cases where the use of AI does not assist, but substitutes for thinking, the cognitive load is shifted onto tool manipulation and "the unique cognitive demands of human-AI collaborative writing" (Yao and Fan 1); creativity is reduced to mere text production; confidence is contingent upon the continuous assistance of the AI.

The various approaches to the use of AI result in different routes of writing development within the conceptual framework. The supportive route is created by the use of AI for the writing and revision process, while the responsibility for argumentation and integration belongs to students. In this case, reduction in language-related load is positively correlated with an increase in creativity and gradually growing confidence. The substitutive route comes about where AI is employed to generate entire

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paragraphs or structure with minimum involvement from the user, running counter to the finding that generative tools function best within a "reflective pedagogy" rather than as a replacement for human instruction (Shabir 543). In this case, cognitive load is transferred from writing to tool management, creativity becomes prompt selection, and confidence is dependent on constant AI availability.

Outcomes of the Analysis

Fairness is another element that should be taken into consideration. Different students have different access to technologies such as artificial intelligence and Internet use, and the skills they possess to utilize those technologies. Additionally, students' familiarity with artificial intelligence varies significantly. Hence, it is possible for teachers to increase the gap between good and bad writers unintentionally. Thus, classrooms using AI demand "developing guidelines to address ethical, effective, and prudent use of AI in academic writing" (Hidayatullah et al. 249).

Ultimately, the solution to these intricate aspects is teacher training on integrating AI into academic writing pedagogically. While some educators may lack familiarity with these tools and adopt an overly optimistic or uncritical stance, others raise valid concerns about student dependency, diminished critical thinking, and the challenges of maintaining academic honesty in the absence of robust institutional frameworks.

Conclusion

The use of technologies based on the idea of generative AI has resulted in significant change in English academic text writing at the tertiary education level. On the one hand, the use of this technology has contributed to increasing the interactivity of writing; on the other hand, it has resulted in cognitive and psychological problems. The shift from traditional writing to AI writing in the context of EFL has altered the process of thinking, writing, and composing for students who need to consider this technology as an auxiliary tool to facilitate the clarity of their writing. Therefore, in higher education in EFL, absolute dismissal or embrace of AI is not the solution. The careful implementation of pedagogical and institutional design is required. In this case, it is the duty of the educators to come up with writing assignments that would ensure that student writing remains unique and that the students can use AI as a tool. It is also the responsibility of the learners to consider their actions while using AI. The policies of institutions regarding AI have to be elaborated to provide clear guidelines and make the generative systems a responsible part of the academic writing process.

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