

Cognitive Offloading and Creativity in Academic Writing: How ChatGPT Shapes Human Thought Processes

Mahdi Rezaei
English Department, Na.C.,
Islamic Azad University,
Najafabad, Iran
M63.rezai@gmail.com

Manoocher Jafarigohar
Department of TEFL and English
Literature, 'Payame Noor University',
Tehran, Iran
jafari@pnu.ac.ir

Hadi Salehi
English Department, Na.C.,
Islamic Azad University,
Najafabad, Iran
hadisaleh1358i@yahoo.com

Abstract— The emergence of generative artificial intelligence (AI) tools such as ChatGPT has transformed the cognitive and creative dimensions of academic writing. This review explores how ChatGPT and similar large language models (LLMs) influence cognitive offloading—the delegation of mental processes to external systems—and how this affects creativity in scholarly composition. A synthesis of research from cognitive psychology, creativity studies, and educational technology reveals two primary interpretations of ChatGPT's role: as a cognitive collaborator that enhances ideation, linguistic fluency, and metacognitive reflection, and as a cognitive crutch that may reduce deep reasoning, originality, and authorial ownership. Evidence suggests that AI-assisted writing can alleviate cognitive load and stimulate divergent thinking, yet overdependence may hinder self-regulation and epistemic engagement. The paper argues for balanced, reflective use of LLMs that supports augmented creativity rather than cognitive outsourcing. Research implications include examining long-term cognitive adaptations to AI-supported writing, while pedagogical implications emphasize the need for AI literacy, metacognitive training, and instructional practices that foster critical and ethical collaboration between human and machine intelligence.

Keywords- *Cognitive offloading, creativity, ChatGPT, academic writing, large language models, metacognition, AI literacy*

I. INTRODUCTION(HEADING 1)

The rapid advancement of generative artificial intelligence (AI) technologies has profoundly transformed the landscape of writing and knowledge creation. It emerges as one of the most important and modern technological improvements of our time [1]. The term AI often brings to mind the image of a powerful supercomputer—an advanced machine with immense processing power, flexible abilities such as sensory perception, and features that give it a human-like quality [2]. According to Aldosari [3], AI represents one of the foremost contemporary applications of information systems, focusing on exploring and replicating human intelligence to develop a new generation of smart computers capable of performing tasks that require

advanced reasoning, deduction, and perception—traits typically associated with human cognition and intelligent behavior. In essence, AI is designed to possess abilities similar to those of humans. AI applications are essential across all aspects of life, encompassing diverse fields such as linguistics, computer science, psychology, philosophy, and mathematics [4]. Moreover, it has been widely adopted and utilized in various forms within the education sector, especially by academic institutions [2]. The rapid advancement of artificial intelligence (AI)-driven language models like ChatGPT, Gemini, and Claude has started to reshape how scholars, educators, and students engage with the process of academic writing. These tools suggest novel capabilities in generating coherent text, suggesting arguments, refining tone, and assisting with editing tasks [5], [6].

As AI tools become more widely integrated into higher education and research environments, academic writing is evolving from an individual cognitive activity into a collaborative process between humans and intelligent systems [7]. This transformation prompts important questions about how these technologies shape writers' thinking, planning, and expression. Within this evolving landscape, one of the most significant changes lies in the reconfiguration of cognitive engagement. When writers employ AI systems like ChatGPT to brainstorm, draft, or revise, they may be offloading specific cognitive functions—such as memory recall, lexical selection, and syntactic formulation—to the model. This phenomenon, known as cognitive offloading, has far-reaching implications for both the efficiency and the depth of human thought [8].

At the same time, the use of AI like ChatGPT in academic writing has gained popularity in recent years due to its ability to enhance productivity and streamline the writing process. Storey [9] and Selim [10] highlight AI tools' potential benefits, such as improved writing quality, time efficiency, and academic integrity. However, concerns have been raised about the impact of AI on critical thinking and creativity [9]. Abd-Elsalam and

The 4th International Conference and the 9th National Conference on Computers, Information Technology and Artificial Intelligence Applications

Abdel-Momen [11] and Lin [12] further emphasize the potential of AI in scientific writing, including idea organization, draft generation, and proofreading. They also underscore the need for transparency, ethics, and human innovation in AI-driven technology.

This review paper brings together the intersection of cognitive offloading and creativity in AI-assisted academic writing, specifically among students, researchers, and scholars. Its objectives are threefold: first, to examine how ChatGPT alters the distribution of cognitive load during the writing process; second, to evaluate its impact on creative idea generation, problem-solving, and metacognitive reflection; and third, to synthesize insights from psychological, educational, and linguistic perspectives into an integrated framework. By exploring how generative AI reshapes the cognitive architecture of writing, this review aims to contribute to a nuanced understanding of the evolving relationship between human creativity and machine intelligence in academic contexts.

II. CONCEPTUAL FOUNDATIONS OF CHATGPT IN ACADEMIC WRITING

A. Cognitive Offloading: Definitions and Mechanisms

The term cognition originates from the Latin word *cognoscere*, meaning "to know" or "to become acquainted with." Cognition encompasses the mental processes involved in acquiring and understanding knowledge through thinking, experience, and sensory perception. It includes various intellectual functions such as attention, knowledge formation, reasoning, calculation, problem-solving, decision-making, and comprehension. Offloading refers to the practice of reducing internal mental effort by storing or managing information externally. This process enables individuals to allocate additional cognitive resources to complex tasks such as reasoning, problem-solving, and making decisions. As a fundamental strategy for memory and information management, cognitive offloading involves using elements of the external environment to decrease the mental load required for processing and completing specific tasks. By reducing the burden on working memory and internal storage, cognitive offloading allows for more efficient cognitive performance. For instance, writing down important information such as phone numbers or reminders on a smartphone exemplifies this process [8].

When individuals delegate portions of their cognitive activity to external tools or systems, they are able to preserve mental capacity for more complex reasoning and decision-making tasks. Common instances of cognitive offloading include practices such as taking notes to capture and organize information, using calculators to perform numerical computations, and employing search engines to access factual data [8], [13]. In such cases, cognitive activity extends beyond the individual mind and becomes shared between internal thought processes and external aids, reflecting the core idea of distributed cognition [14].

Cognitive load theory [15] helps explain how cognitive offloading works by breaking mental effort into three types: intrinsic, extraneous, and germane loads. In simple terms, effective offloading reduces the unnecessary effort spent on tasks that do not directly support learning, allowing the mind to focus on processing and understanding new information. When using generative AI tools such as ChatGPT, cognitive offloading happens as writers hand over parts of the writing process—like drafting text, organizing ideas, or refining language—to the system. This can make writing faster and smoother, yet it also changes how people direct their attention and mental energy. Understanding this balance is important for determining whether AI acts as a supportive thinking partner that enhances human abilities or as a substitute that weakens active engagement in reasoning and creative problem-solving.

. Creativity in Writing

Creativity in writing is about expressing original and meaningful ideas through language in ways that fit the context and add value to the reader's understanding [16]. Various theories of creativity focus on the distinct cognitive processes that drive creative thought. Guilford's [17] divergent thinking model, for example, emphasizes the ability to produce numerous original responses to open-ended challenges. The associative theory offers that creative thought emerges from the ability to connect remote or seemingly unrelated ideas [18]. McIntyre [19] states that creativity results from interactions between the individual writer and broader social and cultural contexts. The model comprises three equally important elements: a domain of knowledge, a field that evaluates and validates that knowledge, and an individual who introduces changes within the domain [19]. Fulton and McIntyre [20] further emphasize that creativity involves not only the producer or the receiver but both, understood as parts of a broader creative system. This approach highlights that creative work arises from the dynamic interaction between individual, social, and cultural factors rather than from individual genius alone.

In academic writing, creativity is expressed through activities such as framing concepts, developing arguments, and experimenting with style. Cognitive theories of writing view creativity as a recurring cycle of incubation, elaboration, and evaluation [21]. During the incubation phase, ideas are subconsciously processed and refined; elaboration involves translating these abstract ideas into concrete written form; and evaluation requires reviewing and judging the originality, coherence, and quality of the work. Each stage relies on flexible thinking, self-regulation, and sustained mental effort. While generative AI tools can support these processes by speeding up idea generation or assisting with language formulation, they also carry the risk of bypassing the reflective and evaluative stages that are essential for producing truly innovative and well-considered writing.

C. Academic Writing as a Cognitive Process

Academic writing is often seen as a complex cognitive activity, where writers plan, compose, and revise their work in

The 4th International Conference and the 9th National Conference on Computers, Information Technology and Artificial Intelligence Applications

a way that resembles solving a complex problem [22]. Becker [23] explains that Flower and Hayes moved away from traditional linear models of writing, advocating instead for process-oriented approaches that highlight cognitive activities in a hierarchical and recursive manner. In the same vein, Alamargot and Chanquoy [24] emphasize that writing is inherently cyclical, with writers constantly shifting among planning key ideas, translating those ideas into text, and revising their work. O'Brien-Moran and Soiferman [25] highlight that this model carries significant implications for teaching, suggesting that grasping the underlying cognitive processes is key to improving writing skills. They point out that its real strength is in framing writing as an active, strategic problem-solving process, rather than merely recording thoughts on paper.

From a cognitive perspective, successful writing relies on the interplay between working memory, long-term memory, and executive functions [21]. According to cognitive load theory, as writing tasks become more complex, individuals need to allocate their mental resources strategically to balance generating ideas with producing coherent text [15]. The introduction of tools like ChatGPT can shift this balance by handling aspects of planning or drafting, which alters how writers engage cognitively. While such assistance can improve fluency and reduce minor errors, it may also externalize essential components of problem-solving and reflective thinking. Viewing academic writing in this way highlights the need to understand how AI-supported offloading affects not only the process of writing itself but also the deeper cognitive mechanisms that underpin it.

III. CHATGPT AS A COGNITIVE TOOL

A. Large Language Models and Human Cognition

Large language models (LLMs) like ChatGPT generate text by anticipating the most likely next word in a sentence, filling in patterns, and producing language that makes sense in context, all based on training with vast amounts of data [26], [5]. Routray et al. [27] describe LLMs as models "trained on vast amounts of text data to understand and generate human-like language outputs" by capturing "statistical patterns and structures." Mirchandani et al. [28] show that LLMs can surprisingly complete complex token sequences, even with randomly sampled vocabulary, highlighting their strong pattern recognition capabilities. Zhao et al. [29] emphasize that as the number of model parameters increases, these models develop more sophisticated language understanding, enabling nuanced text generation.

By relying on probabilistic predictions and pattern recognition, LLMs can produce language that closely mimics human writing, allowing users to engage with AI as a collaborative partner rather than merely a tool. Cognitively, this interaction reflects distributed cognition models, in which mental tasks are shared between humans and external systems [14]. In academic writing, LLMs can take over repetitive or demanding aspects of text production, giving writers the mental

space to focus on complex reasoning, constructing arguments, and creatively integrating ideas.

B. Forms of Cognitive Offloading in ChatGPT Use

ChatGPT enables multiple forms of cognitive offloading in academic writing, primarily by transferring complex cognitive tasks like idea generation, proofreading, and research planning to an AI platform. Studies have highlighted several ways in which cognitive offloading occurs through ChatGPT. For example, the AI can help writers generate research ideas and create structured outlines, making it easier to organize thoughts and plan projects effectively [30]. It also aids in proofreading, addressing issues like spelling, grammar, and sentence cohesion, which reduces the mental effort needed to produce polished text [31]. Beyond this, ChatGPT can assist in planning, drafting, and revising academic work, streamlining the iterative nature of scholarly writing [32]. While these features can significantly enhance writing efficiency and fluency, research warns that excessive reliance on AI tools may weaken critical thinking skills and raise concerns about academic integrity. Evidence indicates that cognitive offloading is most beneficial when used as a supportive tool, under careful human supervision and reflective engagement.

C. Empirical Findings

Recent empirical studies on ChatGPT use in writing and learning suggest consistent patterns. Empirical studies consistently demonstrate ChatGPT's positive impact on writing and learning, with multiple research efforts revealing significant improvements across various educational contexts. Deng [33] found that students' writing efficiency improved significantly when using ChatGPT, with average writing time reduced by 35 minutes and overall teacher evaluation scores increasing by 1.26 points. Similarly, Xu et al. [34] reported that ChatGPT use enhanced learners' logical structure, vocabulary, and grammar in writing tasks. Yang [35] also observed measurable gains among EFL learners, particularly in composition structure, detail inclusion, and word choice. While these studies highlight strengths such as brainstorming support, grammatical refinement, and personalized learning assistance, scholars caution that ChatGPT use may also introduce risks related to academic integrity and require careful pedagogical implementation [36], [37].

IV. CHATGPT AND CREATIVITY: ENHANCEMENT OR EROSION?

A. Enhancement Pathways

Several studies indicate that ChatGPT can support creative thinking by fostering novel associations and generating fresh ideas, though these benefits come with important caveats. ChatGPT serves as a spark for associative creativity by presenting users with a wide array of ideas, broadening the range of conceptual possibilities available to writers. In academic work—where integrating insights across disciplines is often necessary—AI-generated inputs can bridge unrelated notions, encouraging innovative connections that might not otherwise emerge [38]. Research on generative AI in creative writing further shows that using AI prompts enhances both the perceived originality and enjoyment of creative outputs, offering particular support to individuals who may be less

The 4th International Conference and the 9th National Conference on Computers, Information Technology and Artificial Intelligence Applications

naturally creative by making diverse sources of inspiration more accessible.

Lee and Chung [39] showed that interacting with ChatGPT can improve creative performance across various problem-solving tasks, largely by helping users link concepts that are not obviously related. Building on this, Mehrotra et al. [40] demonstrated that when large language models are prompted to make connections between disparate ideas, they can further strengthen associative creativity. Similarly, Guzik et al. [41] found that ChatGPT ranked in the top 1% for originality on formal creativity assessments. Despite these encouraging findings, Doshi and Hauser [42] warn that while AI may elevate creativity at the individual level, it can also narrow the overall diversity of creative outputs, suggesting that the creative advantages offered by generative AI must be balanced against potential broader limitations.

Human-AI co-ideation also establishes a collaborative dynamic in which ChatGPT augments human intuition, supporting iterative brainstorming that boosts overall creative output. Studies on co-creation models show that structured engagement with AI—such as using tailored prompts for design or storytelling—enhances the work of designers and writers by offering suggestions that are empathetic and aligned with stakeholder needs [43]. This partnership is especially visible in higher education, where cross-disciplinary research demonstrates that AI-supported ideation promotes more divergent thinking and leads to improved concepts as humans further refine AI-generated material [44].

ChatGPT demonstrates considerable potential in helping writers overcome cognitive barriers and writing blocks by offering dynamic, on-demand writing support. Xu and Jumaat [45] show that ChatGPT can assist students by "generating writing outlines, enriching writing content, and synthesizing literature." Liu et al. [46] further confirm its ability to enhance "writing efficiency" and help researchers navigate common writing challenges. However, scholars caution that although ChatGPT provides valuable assistance, it should not replace human creative processes. Royani and Sihombing [47], for example, warn about the risk of "losing creativity" and emphasize the importance of using the tool thoughtfully and strategically. Overall, the evidence suggests that while ChatGPT is a promising aid in academic writing, it should be viewed as a support mechanism rather than a complete solution to writing difficulties.

B. Erosion Pathways

Despite these benefits, several scholars warn of potential erosion pathways that may undermine creativity over time. Excessive dependence on AI for generating ideas may create a form of "cognitive debt," in which users show lowered mental engagement and weakened critical thinking. Neuroimaging research comparing AI-assisted writing with independent essay composition has revealed decreased brain activity under AI-supported conditions [48]. This reliance can produce a homogenizing effect, causing a wide range of ideas to narrow toward AI-generated norms and potentially diminishing the diversity and richness of intellectual discourse [42].

Several studies highlight growing concerns about cognitive dependency, indicating that extensive reliance on ChatGPT can dampen writers' mental engagement and weaken creative thought processes. Kosmyrna et al. [48] showed that users of large language models exhibited reduced neural connectivity, with overall cognitive activity declining as they depended more on AI assistance. Similarly, Zhang et al. [49] identified negative consequences associated with heavy AI use, such as heightened "laziness" and declines in both critical and independent thinking. Anderson et al. [50] also found that ChatGPT-assisted writers generated ideas that were less semantically varied and felt less ownership over their creative output. Moreover, Doshi and Hauser [42] pointed to a significant paradox: while generative AI may enhance individual creativity, it can simultaneously narrow the collective diversity of novel ideas, suggesting deeper systemic risks tied to cognitive overreliance on AI tools.

V. ACADEMIC IMPLICATIONS

A. Educational Context

The increasing use of ChatGPT for cognitive offloading is transforming writing pedagogy, prompting educators to move beyond simply teaching students how to produce text and toward helping them understand when and how to use AI thoughtfully and responsibly throughout the writing process. To ensure students use AI responsibly and effectively, educators need to teach metacognitive strategies that help learners identify which writing tasks can be delegated to AI and which require their own analytical and creative effort. According to Tankelevitch et al. [51], metacognition offers an essential lens for understanding the difficulties users face when interacting with generative AI, stressing the importance of monitoring and managing these interactions. Likewise, Sidra and Mason [52] argue that metacognitive abilities will become increasingly vital as AI systems evolve into collaborative partners, shaping the dynamics of human-AI engagement. Atchley et al. [53] further maintain that educators should treat AI as a constructive collaborator, highlighting the role of metacognition in supporting deep and meaningful learning. Nevertheless, Goyal [54] cautions that relying too heavily on AI may diminish learners' problem-solving skills and metacognitive involvement, making intentional and thoughtful AI use critically important.

This shift calls for rethinking how writing assignments are structured so that the emphasis falls on creative oversight, critical judgment, and the writer's own interpretive work rather than on simply producing AI-generated text. One practical approach is to design tasks that require students to document their thinking—such as reflective notes, process logs, or iterative drafts that show how they evaluated and reshaped AI-generated material [7]. By integrating these elements, instructors can encourage learners to treat AI as a supportive cognitive companion instead of a shortcut, helping them remain actively involved in developing ideas and making thoughtful decisions throughout the writing process.

The 4th International Conference and the 9th National Conference on Computers, Information Technology and Artificial Intelligence Applications

B. Ethical and Epistemic Dimensions

Bringing ChatGPT into academic writing settings also raises a range of ethical and epistemic concerns that require careful consideration. Using AI to help produce written work inevitably brings up difficult questions about who counts as the author, what constitutes original work, and how intellectual ownership should be understood when text is created in partnership with a system like ChatGPT [55]. Ballardini et al. [56] point out that many of our current intellectual property rules were built on the assumption that only human beings can be authors or inventors—an idea that becomes harder to defend as AI begins generating meaningful content. Hedrick [57] offers a different angle, suggesting that even with advanced tools like AI, humans remain in the driver's seat, guiding the system's outputs in ways that make AI closer to a powerful instrument than a genuine co-creator. Craig and Kerr [58] push this debate further by arguing that assigning authorship to AI misunderstands what authorship fundamentally is; the issue is not whether AI is capable, but that authorship itself is rooted in human intentionality and agency. Overall, the literature indicates that while AI can certainly produce text, the question of who—or what—counts as an author remains an open legal and philosophical challenge.

Large language models (LLMs) make it increasingly important for users to practice epistemic humility. Because these systems can produce fluent, confident answers that are sometimes incorrect, writers must approach their outputs with careful skepticism, verifying claims and taking responsibility for the knowledge they choose to adopt or cite. Augenstein et al. [59] highlight that large language models (LLMs) can produce information that is false, misleading, or otherwise inaccurate, raising important societal concerns. Interestingly, Rheu and Cho [60] found that increased familiarity with how LLMs work can sometimes backfire: students who understood the system better were paradoxically less likely to verify its outputs, relying too heavily on the AI's apparent authority. Urban et al. [61] add that students' metacognitive skills are crucial for navigating these risks, showing that certain epistemic beliefs and cognitive biases can lead to greater incorporation of incorrect ChatGPT content. Collectively, this research underscores the need for educational strategies that foster critical thinking and epistemic vigilance, ensuring that users engage with AI-generated knowledge thoughtfully and responsibly.

C. Institutional and Policy Perspectives

While many institutions are working to establish frameworks to uphold academic integrity in the age of AI, progress has been inconsistent, and implementing effective policies remains a complex challenge. Sterling Plata et al. [62] identified three recurring themes in how universities are approaching AI: enforcing academic integrity, educating stakeholders, and integrating AI tools responsibly. However, Perkins and Roe [63] critically observed that despite ChatGPT's widespread impact, no higher education institutions had updated their academic integrity policies in the first six months following its release. Wilson [64] further highlighted that the

development of policies varies widely, with research-intensive universities, such as those in the Russell Group, leading implementation efforts. Collectively, these findings suggest that while institutions are beginning to recognize the challenges posed by AI, comprehensive and consistent approaches to managing its use in academic contexts remain in their early stages.

Transparent reporting of AI involvement in research and writing is increasingly recognized as essential for maintaining trust and accountability in scholarly communication [65]. Many academic organizations now advocate for guidelines that strike a balance between innovation and responsibility, emphasizing clear attribution of AI contributions, active human oversight, and well-defined limits on the use of AI-generated content in publications. Together, these policy efforts aim to ensure that tools like ChatGPT support learning and research while upholding ethical standards and the integrity of academic work.

VI. INTEGRATIVE FRAMEWORK AND FUTURE

DIRECTIONS

A. Proposed Theoretical Model

To explore how ChatGPT influences academic writing, we propose a conceptual framework that positions AI-assisted writing at the crossroads of three interconnected elements: cognitive offloading, metacognitive regulation, and creative thinking. This model highlights how AI tools can relieve mental effort for routine tasks, how writers' self-monitoring shapes effective use, and how creativity emerges from the dynamic interplay between human and machine contributions.

The proposed conceptual framework highlights the complex interplay between ChatGPT, cognitive offloading, and creativity in academic writing, illustrating both promising benefits and potential risks. Research supports this nuanced perspective. Lin [66] introduced a human-AI collaborative model demonstrating how AI can reduce cognitive effort, enhance idea generation, and stimulate imagination in writing tasks. In contrast, Georgiou [67] found evidence that reliance on AI may lower cognitive engagement, suggesting that offloading mental effort to ChatGPT carries potential drawbacks. Alamri et al. [68] further corroborated these findings, showing that while ChatGPT aids in idea generation and writing planning, it can simultaneously reduce originality and creative thinking. Hutson [69] proposed a multidimensional framework emphasizing that AI can assist in various stages of writing without fully replacing human agency, underscoring the importance of maintaining intellectual responsibility and active engagement in the creative process. Collectively, these studies reinforce the need for balanced, reflective use of AI tools in academic writing to maximize their benefits while mitigating cognitive and creative risks.

AI tools such as ChatGPT can lighten the cognitive burden of routine writing tasks, including brainstorming, outlining, and proofreading, allowing writers to devote more mental energy to

The 4th International Conference and the 9th National Conference on Computers, Information Technology and Artificial Intelligence Applications

complex activities like generating original ideas, constructing coherent arguments, and critically evaluating their work [8], [15]. Metacognitive abilities serve as a guiding framework, helping writers strategically leverage AI tools while ensuring sustained engagement, self-monitoring, and reflective thinking throughout the writing process [51], [52].

B. Research Gap and Future Study

Although interest in AI-supported writing continues to expand, several important empirical questions remain unanswered. For instance, we still know little about how regular, long-term use of ChatGPT shapes students' writing abilities, their metacognitive habits, or their capacity for creative thinking. Addressing these gaps will require longitudinal studies that track these developments over time [45], [61]. Individual traits also appear to play an important role in shaping how effectively people use AI tools. Factors such as cognitive style, epistemic beliefs, and existing domain knowledge may influence whether ChatGPT supports or hinders learning and creativity [48], [42]. Methodologically, future research would benefit from integrating cognitive process-tracing techniques, think-aloud protocols, and neurocognitive measures such as fMRI and EEG to better capture the mental and neural dynamics of human-AI co-writing. Such multimethod approaches can offer a deeper understanding of how writers reason, monitor, and create when collaborating with tools like ChatGPT [21], [26].

C. Implications for Human-AI Co-creativity

The conversation around AI in academic writing is gradually shifting away from viewing these tools as potential replacements for human thinkers and toward recognizing their value as scaffolds that can strengthen creative work. When used to spark ideas, structure thoughts, or support reflection—without overtaking critical reasoning—AI systems can help cultivate a genuinely symbiotic relationship in which human creativity is expanded rather than diminished [40], [7]. To achieve this balance, both educational practices and AI design must prioritize intentional, reflective use. This means encouraging students and writers to engage with AI in ways that enhance metacognitive awareness, deepen creative exploration, and uphold academic rigor [53], [54]. Approached in this way, ChatGPT and similar tools become meaningful collaborators in the writing process—partners that enrich rather than replace human intellectual effort, ultimately contributing to a more dynamic and cognitively engaging form of academic creativity.

VII. CONCLUSION

The incorporation of ChatGPT and other large language models into academic writing is transforming how we approach knowledge work. By allowing writers to offload routine cognitive tasks—such as brainstorming, outlining, proofreading, and synthesizing literature—these tools can free mental resources for higher-order thinking, complex argumentation, and creative idea generation. However, this convenience comes with nuanced challenges, including the risk of over-reliance, reduced metacognitive engagement,

convergence of ideas, and questions surrounding authorship, originality, and epistemic responsibility. Research indicates that ChatGPT has the potential to enhance creativity by facilitating associative thinking and helping writers overcome cognitive blocks, yet its effectiveness is greatest when it functions as a collaborative cognitive partner rather than a replacement for human reasoning. The ethical, pedagogical, and institutional dimensions are equally important, underscoring the need for teaching practices that foster reflective AI use, critical evaluation, and metacognitive skill development. Likewise, transparent policies and guidelines are essential to ensure accountability, maintain academic integrity, and responsibly integrate AI into research and writing workflows. In essence, ChatGPT represents a broader evolution in human interaction with cognitive tools: its true value lies in extending and augmenting human thought rather than substituting for it. Future studies should investigate how to strike the right balance between leveraging AI for cognitive offloading and maintaining active engagement, ensuring that these technologies serve as catalysts for creativity, learning, and scholarly excellence rather than shortcuts that compromise intellectual growth.

REFERENCES

- [1] M. Golan, R. Reddy, A. Muthigi, and R. Ramasamy, "Artificial intelligence in academic writing: a paradigm-shifting technological advance," *Nat. Rev. Urol.*, 2023, doi: 10.1038/s41585-023-00746-x.
- [2] L. Chen, P. Chen, and Z. Lin, "Artificial intelligence in education: A review," *IEEE Access*, vol. 8, pp. 75264–75278, 2020, doi: 10.1109/ACCESS.2020.2988510.
- [3] S. A. M. Aldosari, "The future of higher education in the light of artificial intelligence transformations," *Int. J. Higher Educ.*, vol. 9, no. 3, pp. 145–151, 2020.
- [4] K. L. Viktorivna, V. A. Oleksandrovych, K. I. Oleksandrivna, and K. N. Oleksandrivna, "Artificial intelligence in language learning: What are we afraid of," *Arab World English J.*, vol. 8, pp. 262–273, 2022, doi: 10.24093/awej/call8.18.
- [5] OpenAI, "GPT-4 technical report," arXiv:2303.08774, 2023.
- [6] Y. K. Dwivedi et al., "So what if ChatGPT wrote it? Multidisciplinary perspectives on opportunities, challenges, and implications of generative conversational AI for research, practice, and policy," *Int. J. Inf. Manage.*, vol. 71, p. 102642, 2023, doi: 10.1016/j.ijinfomgt.2023.102642.
- [7] E. Kasneci et al., "ChatGPT for good? On opportunities and challenges of large language models for education," *Learn. Individ. Differ.*, vol. 103, p. 102274, 2023, doi: 10.1016/j.lindif.2023.102274.
- [8] E. F. Risko and S. J. Gilbert, "Cognitive offloading," *Trends Cogn. Sci.*, vol. 20, no. 9, pp. 676–688, 2016.
- [9] V. A. Storey, "AI technology and academic writing: Knowing and mastering the 'craft skills'," *Int. J. Adult Educ. Technol.*, vol. 14, no. 1, pp. 1–15, 2023.

**The 4th International Conference and the 9th National Conference on
Computers, Information Technology and Artificial Intelligence Applications**

- [10] A. S. Selim, "The transformative impact of AI-powered tools on academic writing: Perspectives of EFL university students," *Int. J. English Linguist.*, 2024.
- [11] K. A. Abd-El Salam and S. M. Abdel-Momen, "Artificial intelligence's development and challenges in scientific writing," *Egypt. J. Agric. Res.*, vol. 101, no. 3, pp. 714–717, 2023.
- [12] Z. Lin, "Techniques for supercharging academic writing with generative AI," *Nat. Biomed. Eng.*, pp. 1–6, 2024.
- [13] A. Clark and D. Chalmers, "The extended mind," *Analysis*, vol. 58, no. 1, pp. 7–19, 1998.
- [14] E. Hutchins, *Cognition in the Wild*. Cambridge, MA: MIT Press, 1995.
- [15] J. Sweller, "Cognitive load theory," in *Psychology of Learning and Motivation*, vol. 55, Academic Press, 2011, pp. 37–76.
- [16] M. A. Runco and G. J. Jaeger, "The standard definition of creativity," *Creat. Res. J.*, vol. 24, no. 1, pp. 92–96, 2012.
- [17] J. P. Guilford, "Creativity," *Amer. Psychol.*, vol. 5, no. 9, pp. 444–454, 1950.
- [18] S. Mednick, "The associative basis of the creative process," *Psychol. Rev.*, vol. 69, no. 3, pp. 220–232, 1962.
- [19] P. McIntyre, "Rethinking creativity and approaches to teaching: The systems model and creative writing," *Creat. Think. Skills Learn.*, vol. 1, no. 1, pp. 1–11, 2007.
- [20] J. Fulton and P. McIntyre, "Futures of communication: Communication studies~ creativity," *Rev. Commun.*, vol. 13, no. 4, pp. 269–289, 2013.
- [21] R. T. Kellogg, "Training writing skills: A cognitive developmental perspective," *J. Writ. Res.*, vol. 1, no. 1, pp. 1–26, 2008.
- [22] L. Flower and J. R. Hayes, "A cognitive process theory of writing," *Coll. Compos. Commun.*, vol. 32, no. 4, pp. 365–387, 1981.
- [23] A. Becker, "A review of writing model research based on cognitive processes," in *Revision: History, Theory, and Practice*, 2006, pp. 25–49.
- [24] D. Alamargot and L. Chanquoy, "Nature and control of processing," in *Through the Models of Writing*, Dordrecht: Springer, 2001, pp. 125–154.
- [25] M. O'Brien-Moran and L. K. Soiferman, "How an understanding of cognition and metacognition translates into more effective writing instruction," *Online Submiss.*, 2010.
- [26] S. Bubeck et al., "Sparks of artificial general intelligence: Early experiments with GPT-4," arXiv:2303.12712, 2023.
- [27] S. K. Routray et al., "Large language models (LLMs): Hypes and realities," in *Proc. 2023 Int. Conf. Comput. Sci. Emerg. Technol. (CSET)*, 2023, pp. 1–6.
- [28] S. Mirchandani et al., "Large language models as general pattern machines," arXiv:2307.04721, 2023.
- [29] W. X. Zhao et al., "A survey of large language models," arXiv:2303.18223, 2023.
- [30] J. Wang and W. Fan, "The effect of ChatGPT on students' learning performance, learning perception, and higher-order thinking: insights from a meta-analysis," *Humanit. Soc. Sci. Commun.*, vol. 12, no. 1, pp. 1–21, 2025.
- [31] R. Alqadi et al., "Exploring the user experience and the role of ChatGPT in the academic writing process," in *Proc. 2023 Congr. Comput. Sci., Comput. Eng., & Appl. Comput. (CSCE)*, 2023, pp. 1082–1089.
- [32] M. Rezaei, H. Salehi, and O. Tabatabaei, "Uses and misuses of ChatGPT as an AI-language model in academic writing," in *Proc. 2024 10th Int. Conf. Artif. Intell. Robot. (QICAR)*, 2024, pp. 256–260.
- [33] X. Deng, "An empirical study on the application of ChatGPT in writing learning for English major students," *J. Educ. Res. Policies*, vol. 7, no. 1, pp. 37–41, 2025.
- [34] J. Xu et al., "The impact of using ChatGPT on EFL students' writing," in *Proc. 2024 IEEE Int. Conf. Adv. Learn. Technol. (ICALT)*, 2024, pp. 126–128.
- [35] Y. Yang, "An empirical study on the impact of ChatGPT on writing proficiency in Chinese EFL learners," *Curr. Teach. Methodol.*, vol. 7, no. 4, pp. 172–178, 2024.
- [36] M. A. AlAfnan et al., "ChatGPT as an educational tool: Opportunities, challenges, and recommendations for communication, business writing, and composition courses," *J. Artif. Intell. Technol.*, vol. 3, no. 2, pp. 60–68, 2023.
- [37] A. Pham et al., "Pedagogical implications of AI writing assistants: A systematic review," *Educ. Inf. Technol.*, 2025.
- [38] A. Bushnell and T. Harrison, "A new muse: How guided AI use impacts creativity in online creative writing courses," Oregon State University, Tech. Rep., 2025. [Online]. Available: <https://ecampus.oregonstate.edu/research/wp-content/uploads/Bushnell-Harrison-2025.White-paper.pdf>
- [39] B. C. Lee and J. Chung, "An empirical investigation of the impact of ChatGPT on creativity," *Nat. Hum. Behav.*, vol. 8, no. 10, pp. 1906–1914, 2024.
- [40] P. Mehrotra, A. Parab, and S. Gulwani, "Enhancing creativity in large language models through associative thinking strategies," arXiv:2405.06715, 2024.
- [41] E. E. Guzik, C. Byrge, and C. Gilde, "The originality of machines: AI takes the Torrance Test," *J. Creat.*, vol. 33, no. 3, p. 100065, 2023.
- [42] A. R. Doshi and O. P. Hauser, "Generative AI enhances individual creativity but reduces the collective diversity of novel content," *Sci. Adv.*, vol. 10, no. 28, p. eadn5290, 2024.
- [43] P. Wang et al., "Enhancing designer creativity through human-AI co-ideation: a co-creation framework for design ideation with custom GPT," *AI EDAM*, vol. 39, p. e22, 2025.
- [44] R. Balta-Salvador, E. Brasó-Vives, and M. Pena, "Evaluating AI-assisted creative ideation: A crossover study in higher education," *Think. Skills Creat.*, p. 101958, 2025.
- [45] T. Xu and N. F. Jumaat, "ChatGPT-empowered writing strategies in EFL students' academic writing: Calibre, challenges and chances," *Int. J. Interact. Mobile Technol.*, vol. 18, no. 15, 2024.
- [46] Y. Liu, W. Kong, and K. Merve, "ChatGPT applications in academic writing: a review of potential, limitations, and ethical challenges," *Arq. Bras. Oftalmol.*, vol. 88, no. 3, p. e2024-0269, 2025.

**The 4th International Conference and the 9th National Conference on
Computers, Information Technology and Artificial Intelligence Applications**

- [47] I. Royani and M. R. Sihombing, "ChatGPT in the academic writing classroom," *Esteem J. English Educ. Study Programme*, vol. 7, no. 2, pp. 630–638, 2024.
- [48] N. Kosmyrna et al., "Your brain on chatgpt: Accumulation of cognitive debt when using an ai assistant for essay writing task," arXiv:2506.08872, 2025.
- [49] S. Zhang, X. Zhao, T. Zhou, and J. H. Kim, "Do you have AI dependency? The roles of academic self-efficacy, academic stress, and performance expectations on problematic AI usage behavior," *Int. J. Educ. Technol. Higher Educ.*, vol. 21, no. 1, p. 34, 2024.
- [50] B. R. Anderson, J. H. Shah, and M. Kreminski, "Homogenization effects of large language models on human creative ideation," in *Proc. 16th Conf. Creat. & Cogn.*, 2024, pp. 413–425.
- [51] L. Tankelevitch et al., "The metacognitive demands and opportunities of generative AI," in *Proc. 2024 CHI Conf. Hum. Factors Comput. Syst.*, 2024, pp. 1–24.
- [52] S. Sidra and C. Mason, "Reconceptualizing AI literacy: The importance of metacognitive thinking in an artificial intelligence (AI)-enabled workforce," in *Proc. 2024 IEEE Conf. Artif. Intell. (CAI)*, 2024, pp. 1181–1186.
- [53] P. Atchley et al., "Human and AI collaboration in the higher education environment: opportunities and concerns," *Cogn. Res.: Princ. Implic.*, vol. 9, no. 1, p. 20, 2024.
- [54] A. Goyal, "AI as a cognitive partner: A systematic review of the influence of AI on metacognition and self-reflection in critical thinking," *Int. J. Innov. Sci. Res. Technol.*, vol. 10, no. 3, pp. 1231–1238, 2025.
- [55] L. Floridi and M. Chiriatti, "GPT-3: Its nature, scope, limits, and consequences," *Minds Mach.*, vol. 30, no. 4, pp. 681–694, 2020.
- [56] R. M. Ballardini, K. He, and T. Roos, "AI-generated content: authorship and inventorship in the age of artificial intelligence," in *Online Distribution of Content in the EU*, Edward Elgar Publishing, 2019, pp. 117–135.
- [57] S. F. Hedrick, "I think, therefore I create: claiming copyright in the outputs of algorithms," *NYU J. Intell. Prop. & Ent. L.*, vol. 8, p. 324, 2018.
- [58] C. Craig and I. Kerr, "The death of the AI author," in *Robot Law: Volume II*, Edward Elgar Publishing, 2025, pp. 250–285.
- [59] I. Augenstein et al., "Factuality challenges in the era of large language models," arXiv:2310.05189, 2023.
- [60] M. Rheu and J. Cho, "The trap of AI literacy: The paradoxical relationships between college students' use of LLMs, AI literacy, and fact-checking behavior," in *Proc. Extended Abstr. CHI Conf. Hum. Factors Comput. Syst.*, 2025, pp. 1–7.
- [61] M. Urban et al., "'ChatGPT can make mistakes. Check important info.' Epistemic beliefs and metacognitive accuracy in students' integration of ChatGPT content into academic writing," *Br. J. Educ. Technol.*, 2025.
- [62] S. Plata, M. A. De Guzman, and A. Quesada, "Emerging research and policy themes on academic integrity in the age of chat GPT and generative AI," *Asian J. Univ. Educ.*, vol. 19, no. 4, pp. 743–758, 2023.
- [63] M. Perkins and J. Roe, "Decoding academic integrity policies: A corpus linguistics investigation of AI and other technological threats," *Higher Educ. Policy*, vol. 37, no. 3, pp. 633–653, 2024.
- [64] T. D. Wilson, "The development of policies on generative artificial intelligence in UK universities," *IFLA J.*, 2025.
- [65] Nature Editorial, "Tools such as ChatGPT threaten transparent science; here are our ground rules for their use," *Nature*, vol. 613, no. 7945, p. 612, 2023.
- [66] Z. Lin, "Techniques for supercharging academic writing with generative AI," *Nat. Biomed. Eng.*, vol. 9, no. 4, pp. 426–431, 2025.
- [67] G. P. Georgiou, "ChatGPT produces more 'lazy' thinkers: Evidence of cognitive engagement decline," arXiv:2507.00181, 2025.
- [68] W. Alamri, F. Qasem, A. Alfotais, and H. Al Taisan, "Leveraging ChatGPT AI Model in Academic Writing and Avenues for Further Development: SWOT Framework," in *Forum for Linguistic Studies*, vol. 7, no. 02, 2025.
- [69] J. Hutson, "Human-ai collaboration in writing: A multidimensional framework for creative and intellectual authorship," *Int. J. Changes Educ.*, 2025.