Generative Artificial Intelligence and Human Creativity: A Narrative Review of Behavioral and Neuroscientific Evidence

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Abstract. *The increasing adoption of generative artificial intelligence (AI) and Large Language Models (LLMs) is transforming how individuals process knowledge, develop ideas, and approach creative tasks. This narrative review examines the effects of human-AI interaction on creativity by integrating behavioral and neuroscientific evidence. Experimental studies indicate that LLM assistance can improve the average quality of creative outputs, while also favoring idea convergence and reducing the diversity of solutions at the collective level. Furthermore, the benefits observed during interaction with these AI-systems do not necessarily translate into improvements in subsequent autonomous performance. From a neuroscientific perspective, the review examines the contribution of brain networks involved in creative cognition and emerging electroencephalographic evidence on LLM-assisted writing. These preliminary findings reveal differences in functional connectivity, notably in the theta and alpha frequency bands, with generally more widespread connectivity patterns during unaided production, accompanied by differences in content recall and sense of authorship. Although preliminary, these results suggest that generative AI assistance may alter patterns of cognitive engagement during task performance, without demonstrating lasting effects on individual abilities. From this perspective, cognitive offloading represents a central process for understanding both the opportunities and risks associated with cognitive delegation. In educational settings, this review highlights the importance of designing forms of human-AI collaboration that, through appropriately calibrated support and interactions aimed at encouraging independent inquiry, foster the exploration of alternatives, critical evaluation, and the development of cognitive autonomy, beyond the quality of immediate outcomes.*

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Keywords: *Large Language Models; divergent thinking; cognitive offloading; human-AI collaboration; electroencephalography; functional magnetic resonance imaging; creative cognition.*

It is estimated that more than one billion people use generative artificial intelligence (AI) systems (report from Microsoft AI Economy Institute, 2025). Digital technologies have long supported complex cognitive activities, but many everyday tools have traditionally been used primarily to store, retrieve, and organize information. Generative AI systems, particularly Large Language Models (LLMs), represent a significant shift in this relationship, as they can generate text, develop arguments, reformulate problems, and propose solutions through natural language interactions. By enabling users to delegate processes such as idea generation, conceptual organization, and linguistic formulation, these AI-based systems may alter how individuals engage in cognitive activities and, when such delegation becomes systematic, it may reduce opportunities to practice and consolidate the cognitive skills involved. This concern relates to the concept of *cognitive offloading*, defined as the use of external resources to reduce cognitive demands which, although potentially beneficial for immediate performance, may limit opportunities for learning and skill development when external resources replace cognitive operations that would otherwise be performed independently (Risko & Gilbert, 2016).

A theoretical framework for understanding the relationship between human cognition and digital technologies is provided by Clark and Chalmers' theory of the *extended mind*, which conceptualizes cognition as a process that can incorporate environmental resources and external tools functionally integrated into thinking (Clark, 2025). From this perspective, technologies are not merely external aids but may become integral components of cognitive processes, actively contributing to information processing and knowledge construction. The emergence of generative AI, however, introduces a new dimension to this relationship, highlighting a tension between two potential consequences of technological integration: on the one hand, these systems may extend individual cognitive capacities (*extending mind*) by providing access to resources that expand opportunities for reasoning, exploration, and knowledge production; on the other hand, they may progressively displace cognitive activities (*extracting mind*) when the systematic delegation of certain operations reduces opportunities to perform them independently. In this context, Loock's concept of *extracted cognition* draws attention to the possibility that increasingly sophisticated and autonomous technologies may replace processes involved in developing and maintaining cognitive skills, potentially undermining cognitive autonomy over time (Loock, 2025).

This tension is particularly relevant to human creativity, one of the most complex and distinctive capacities of human cognition. Creativity involves exploring

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alternative possibilities, retrieving and recombining existing knowledge, generating original ideas, and evaluating them in relation to task constraints. Generative AI systems can support many of these processes, yet the immediate availability of AI-generated solutions may also influence how individuals engage in independent exploration, hypothesis generation, and critical evaluation. This raises two central questions: How does interaction with generative AI influence human creativity, and what potential risks does it pose to the cognitive processes that support it?

Artificial Intelligence and Creativity: Evidence from Behavioral Studies

In cognitive research, creativity is defined as the ability to generate ideas, solutions, or artifacts that are simultaneously novel, original, appropriate, and useful in relation to a given task or context (Runco & Jaeger, 2012). Studies employ various types of tasks, each designed to investigate specific aspects of creativity. One of the most extensively investigated dimensions is *divergent thinking*, understood as the ability to generate multiple and diverse in response to a given stimulus or problem. This ability is assessed using experimental instruments such as the *Alternate Uses Task*, which requires participants to identify unconventional uses for everyday objects; the *Consequences Task*, which prompts the generation of hypothetical scenarios and their potential consequences; and the *Divergent Association Task*, which measures the ability to generate semantically distant words. Alongside divergent thinking tasks, studies investigating interactions with LLMs also employ more complex activities, such as narrative writing, the development of entrepreneurial proposals, and the generation of solutions to open-ended problems. The assessment of creative performance encompasses several dimensions: *fluency* refers to the number of relevant responses generated; *flexibility* concerns the variety of conceptual categories explored and the ability to shift perspectives; *originality* refers to the degree of novelty and unconventionality of the responses produced; and *elaboration* concerns the level of detail with which a response is developed. In recent years, computational methods based on text analysis have become increasingly widespread, enabling the quantification of conceptual proximity between words, ideas, or entire texts through vector-based representations of language. The use of measures of semantic, lexical, syntactic, and stylistic similarity enables researchers to examine different dimensions of textual variability, providing tools for assessing the degree of convergence or diversity among the ideas generated by participants.

A meta-analysis conducted by Holzner and colleagues (2025), encompassing 28 experimental studies with over 8,000 participants, examined the effects of human–

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AI collaboration on the performance of various types of creative tasks, assessing dimensions such as originality, usefulness, and overall quality of the outcomes. The findings revealed a modest, yet significant, average advantage for AI-assisted conditions over independent production, consistent with the hypothesis that LLMs can facilitate idea generation by suggesting alternatives and supporting content organization. However, the empirical evidence is not entirely consistent, as a study involving 600 university students identified potential negative effects of ChatGPT use on certain dimensions of creative writing, including originality, suggesting that the benefits of generative AI assistance may vary across different dimensions of creativity (Niloy *et al.*, 2024). Beyond this variability in individual outcomes, a second issue emerges concerning the diversity of creative outputs. The meta-analysis by Holzner *et al.* (2025) indicates that, although AI collaboration is associated with an average improvement in the quality of individual outputs, it may also reduce the overall diversity of generated ideas. This suggests a dissociation between individual quality and collective variability, whereby generative AI assistance may enhance individual performance while simultaneously narrowing the range of creative alternatives produced within a group. This phenomenon (*convergence effect*) may be explained, at least in part, by the probabilistic functioning of generative language models, which produce responses based on statistical regularities learned during training and the information available in the interaction context, including user-provided instructions and any previous exchanges. Although AI systems are capable of generating innovative combinations, they may provide suggestions in response to similar prompts that exhibit recurring patterns in wording, argumentative structures, and conceptual associations, potentially steering different users toward similar creative trajectories. This phenomenon is particularly relevant in innovation contexts, where the availability of heterogeneous solutions represents an essential resource for identifying unexpected alternatives and challenging established assumptions.

Improvements achieved during interactions with LLMs do not necessarily imply a corresponding increase in individual creative abilities when the task is subsequently performed independently. A study conducted by Kumar and colleagues (2024) addressed this issue through multi-phase divergent thinking tasks. Participants were assigned to conditions involving either no assistance or different forms of LLM support, including the provision of ideas and suggestions. In a subsequent phase, all participants completed a creative task without assistance, allowing researchers to compare independent performance following different initial experiences. After the removal of generative AI assistance, participants who had received strategic suggestions from the LLM generated less original ideas than those who had worked without support. Furthermore, exposure to these suggestions was as-

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sociated with reduced idea diversity already during the assisted phase, an effect that persisted and tended to become more pronounced in the subsequent unassisted phase. These findings suggest that exposure to LLM-generated suggestions may influence subsequent ideation strategies by temporarily narrowing the range of alternatives explored, potentially limiting the transfer of benefits from AI-assisted to independent creative performance.

The analysis of the effects of generative AI assistance on creative outputs can extend beyond performance observed in individual tasks to encompass changes in the linguistic characteristics of texts over time, in relation to the increasing adoption of generative models. In an observational study, Sourati and colleagues (2026) analyzed a large corpus of texts published between 2018 and 2024, including online stories, news articles, and academic preprints. Their analysis revealed a reduction in certain measures of lexical and syntactic variability following the widespread adoption of LLMs, suggesting a convergence in linguistic expression. The authors also observed that a higher prevalence of content attributable to the use of generative models preceded a decline in linguistic diversity in subsequent periods.

Taken together, these findings highlight the need to consider the effects of generative AI assistance at multiple levels. Improvements in the quality of individual creative output do not necessarily translate into greater diversity of ideas, just as the benefits observed during AI-assisted tasks do not necessarily lead to corresponding improvements in subsequent independent performance. The widespread use of language models may promote a gradual convergence in linguistic expression and conceptual structures, with potential implications for the diversity of creative outputs at the collective level.

Cognitive and Neuroscientific Foundations of Creativity

In psychology, creative thinking is understood as the result of the interaction between spontaneous associative processes of idea generation and cognitive control mechanisms. The former facilitate the activation of representations that are not immediately connected, while the latter guide their selection and organization according to task goals, thereby framing creativity as the result of a dynamic balance between associative flexibility and executive control. This perspective is supported by neuroscientific research, which has progressively moved beyond the notion that creativity is localized in specific brain regions, thus favoring models based on interactions among distributed brain networks. Numerous neuroimaging studies have highlighted the coordinated involvement of the *Default Mode Network* (DMN) and the *Executive Control Network* (ECN). The DMN, which includes cortical regions such as the medial prefrontal cortex, posterior cingulate cortex, precuneus,

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and parietal and temporal areas, is associated with self-generated thought, autobiographical memory retrieval, mental simulation, and the construction of imagined scenarios, all processes that are relevant to the retrieval and recombination of mental representations. The ECN involves prefrontal and parietal regions implicated in cognitive control, goal maintenance, and the selection of relevant information, contributing to the evaluation of alternatives in relation to task constraints. Although traditionally associated with distinct and potentially antagonistic functional modes, these networks can cooperate during creative production: the DMN contributes to the generation of candidate representations, while the ECN supports their organization and evaluation through *top-down* control processes (Beaty *et al.*, 2016). Neuroimaging evidence suggests that creative thinking involves a dynamic interaction among different brain networks: spontaneous associative processes play a more prominent role during idea generation, whereas executive control mechanisms become more engaged during the evaluation and revision phases. Creativity thus emerges from the flexible coordination of these processes rather than from the isolated activation of individual cognitive functions.

Building on this evidence, recent research has begun to explore potential correspondences between patterns of brain activity associated with creative processes and the computational representations of generative AI models. Ismayilzada *et al.* (2026) employed *Representational Similarity Analysis* to compare the internal representations of different LLMs with patterns of brain activity measured using fMRI during divergent thinking tasks. Specifically, the authors presented the LLMs with stimuli analogous to those used in the experiment involving human participants and compared the similarity relationships among LLM-generated representations with those observed in brain activity patterns within the DMN and ECN, with the aim of assessing whether stimuli represented as similar by LLMs also exhibited similar neural activity patterns. The results indicate that the correspondence between LLM representations and patterns of brain activity increased with model size in the DMN and with the originality of ideas in both the DMN and ECN, and that this correspondence was more pronounced during the early stages of creative processing. Together, these findings suggest correspondences in the representational organization of human and artificial creative processing, without implying equivalence between their underlying neural and computational mechanisms (Ismayilzada *et al.*, 2026).

Alongside neuroimaging, the neural correlates of creativity have been investigated using electroencephalography (EEG), which allows neural oscillations to be characterized in terms of frequency, amplitude, spatial distribution, and coordination across brain regions. Numerous studies have shown that idea generation tasks associated with divergent thinking are accompanied by increased alpha-band (8-12

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Hz) power, particularly in frontal and posterior parietal regions (Fink & Benedek, 2014). In frontal regions, this increase appears to reflect an inward orientation of attention toward internal cognitive processes, facilitating the retrieval of knowledge from semantic and episodic memory and the formation of original associations. Consistent with this evidence, Fu and colleagues (2022) found that participants with higher levels of everyday creativity, as assessed using the *Creative Behavior Inventory*, exhibited greater increases in right frontal alpha activity and frontotemporal functional connectivity during the *Alternate Uses Task*. In occipitoparietal regions, increased alpha power appears to contribute to the regulation of sensory processing by reducing interference from external information and facilitating the maintenance of attention on internal representations (Fink & Benedek, 2014). Consistent with this interpretation, Rominger *et al.* (2022) found that the generation of more original ideas was associated with greater right posterior alpha power and increased fronto-parieto-occipital functional connectivity.

Theta-band oscillations (4–8 Hz) are associated with cognitive control, working memory, and information integration across large-scale distributed brain networks. Frontal midline theta activity is associated with performance monitoring and goal-directed behavioral regulation; more broadly, theta oscillations contribute to the organization of representations in working memory and functional coordination across different brain regions (Cavanagh & Frank, 2014). In creative thinking, these functions may support the elaboration and evaluation of ideas by facilitating the maintenance of mental representations, the comparison of alternatives, and the selection of the most appropriate solutions. In this regard, an EEG study investigating creative problem-solving processes revealed increased frontal theta synchronization during the early stages of developing innovative solutions, suggesting the involvement of performance monitoring and cognitive control mechanisms (Tang *et al.*, 2021). Overall, this evidence suggests that theta activity may represent a neural correlate of the executive processes involved in the elaboration and evaluation of creative ideas.

Partially divergent findings emerge from the study by Krumm and colleagues (2025), who used EEG to investigate brain activity in children aged 9 to 12 years performing verbal and figural divergent thinking tasks. The authors observed increased oscillatory power across several frequency bands during task performance compared with the resting condition. In the verbal task, however, relative alpha-band power was negatively correlated with the fluency and originality of responses, in contrast to findings generally reported in studies of creative ideation in adults. Functional connectivity analysis further revealed increased intra-hemispheric synchronization, particularly between frontal and temporal regions and between temporal and occipital regions, accompanied by reduced frontal inter-hemispheric co-

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herence. These findings suggest a reorganization of functional interactions among brain regions during creative thinking, potentially associated with the engagement of memory-related, associative, and attentional processes. Such differences from adult literature may reflect the level of neurocognitive maturation, as well as variations in experimental task characteristics and EEG methodologies.

AI-Assisted Creativity and Neural Dynamics

Writing represents a particularly suitable domain for the expression and investigation of creativity, as it involves complex cognitive processes that integrate knowledge retrieval, idea generation, planning, working memory, linguistic formulation, and coherence monitoring. Some evidence suggests that generative AI assistance may reduce perceived cognitive effort and shift users' engagement from direct content generation toward the supervision, revision, and selection of AI-generated outputs (Noy & Zhang, 2023), thereby altering the distribution of cognitive engagement across different task components. Understanding the implications of this reorganization requires a deeper investigation of the cognitive and neural mechanisms underlying creative production.

One of the first studies to address this issue was conducted by Kosmyna *et al.* (2025), who used EEG recordings to investigate brain activity during argumentative essay writing, comparing three experimental conditions: LLM-assisted writing, writing with access to a traditional search engine, and independent writing, referred to as the *Brain-only* condition. By applying the *Dynamic Directed Transfer Function* to EEG signals, the authors examined how different brain regions communicate and coordinate during task performance, analyzing the directionality of information flow, the frequency bands involved, and how these interactions change over time. Focusing on the comparison between the *Brain-only* and LLM-assisted groups, the overall findings indicated that the *Brain-only* condition exhibited more extensive EEG connectivity patterns than the LLM-assisted condition, with particularly pronounced differences in the alpha and theta frequency bands. These findings suggest that independent writing may require greater functional coordination among neural systems involved in language processing, knowledge retrieval, and planning, whereas the availability of externally generated content during LLM-assisted writing may reduce the need to engage these processes directly.

One of the most notable differences observed by Kosmyna *et al.* (2025) concerns alpha-band connectivity. In the independent writing condition, the authors reported more extensive connectivity among posterior, temporal, and frontal regions than in the LLM-assisted condition, a finding consistent with the role of alpha oscillations in internally directed attention. Whereas independent writing requires

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continuous interaction between internal cognitive processing and attentional regulation to support idea generation and textual monitoring, generative AI assistance may shift some of these operations to the system, redirecting users' cognitive engagement toward the evaluation and integration of suggested content. The less extensive alpha-band connectivity patterns may therefore reflect a different distribution of cognitive demands.

Another relevant finding concerns the theta frequency band, whose oscillations, particularly in frontal midline regions and fronto-parietal and fronto-temporal networks, are associated with working memory, cognitive control, and information retrieval and integration. These processes are essential for writing, which requires maintaining the overall topic, previously developed content, ideas to be elaborated, and the textual plan in working memory, while selecting and organizing relevant information and monitoring text production. Theta oscillations may contribute to functional coordination between frontal regions involved in executive control and temporal and posterior regions implicated in information retrieval and integration processes. Comparisons between experimental conditions revealed significant differences in the strength and directionality of theta-band connectivity. In the *Brain-only* group, the theta network exhibited stronger and more extensive connectivity, with a greater number of significant connections than in the LLM-assisted group and pronounced bidirectional interactions among the regions involved. Connections from frontal to posterior regions, particularly parietal and occipital areas, are consistent with *top-down* coordination, through which executive systems contribute to goal maintenance, planning, and text organization. Conversely, connections from posterior and temporal regions toward frontal areas suggest the dynamic integration of information into planning and control processes. This bidirectional communication is consistent with the cognitive demands of independent writing, which requires continuous interaction between systems responsible for information retrieval and processing and those involved in information selection and organization. In the LLM-assisted group, this bidirectional communication was generally reduced, particularly in connections from frontal to posterior regions. These differences suggest that generative AI assistance may alter the distribution of cognitive operations during writing, providing a potential neurophysiological correlate of *cognitive offloading*: delegating certain text formulation and organization processes to an artificial system may reduce the need for internal coordination among working memory, information retrieval, and executive control processes.

This different mode of cognitive processing appears to influence certain behavioral measures, particularly the ability to recall recently written content. In the study by Kosmyna *et al.* (2025), participants who had used an LLM showed greater difficulty in accurately recalling passages from the text they had just produced

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compared with those who had written independently. Greater theta- and alpha-band connectivity along parieto-frontal and temporo-frontal pathways may facilitate deeper semantic processing, stronger verbal and conceptual integration, more effective memory encoding, and more efficient and sustained executive monitoring. This may help explain both the greater accuracy in recalling and quoting one's own text and the stronger sense of ownership observed among participants in the *Brain-only* condition, who tended to identify themselves as the sole authors of their writing, whereas those in the LLM-assisted condition reported a more limited sense of authorship. The study also examined the effects of switching between writing conditions. After a series of initial sessions, some participants transitioned from independent to LLM-assisted writing, while others followed the reverse sequence. Participants who had initially completed the task without assistance exhibited more extensive patterns of functional connectivity even after the introduction of LLM assistance, whereas those who had used the model from the outset showed relatively lower connectivity during the subsequent unassisted condition. These findings suggest that the initial mode of task performance may influence subsequent patterns of neural recruitment and functional connectivity within the brain networks involved in creative writing.

Overall, the study by Kosmyna *et al.* (2025) provides a preliminary contribution to understanding the potential neurophysiological changes associated with the use of generative AI in written production. However, the interpretation of these findings requires caution in light of the methodological concerns raised by Stanković *et al.* (2025), particularly regarding the limited sample size, EEG analysis procedures, and reproducibility of the results, which constrain their robustness and generalizability. These limitations are compounded by the difficulty of assigning an unambiguous cognitive interpretation to differences in functional connectivity, as distinct neurophysiological patterns may reflect diverse factors, such as variations in task demands, processing strategies, or the efficiency of the underlying cognitive processes.

Subsequent research has examined how brain activity during interactions with AI may vary depending on task characteristics and modes of human-AI collaboration. Wang *et al.* (2026) investigated the neural correlates of co-creation with generative AI, involving participants with and without design experience in a task consisting of three phases: image generation, selection, and description of the creative product. The study compared two modes of AI-assisted co-creation: a "narrative" mode, focused on developing coherent content around a central theme, and a "divergent" mode, aimed at exploring multiple creative alternatives. Brain activity was monitored using *functional near-infrared spectroscopy*, a technique that measures changes in cerebral oxygenation associated with neural activity. The results revealed differences in brain activation depending on the co-creation mode and par-

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ticipants" level of experience: among participants with design experience, the "divergent" condition elicited greater brain activation than the "narrative" condition across all three phases of the task; among participants without design experience, however, the relationship between co-creation mode and brain activation varied according to the task phase: greater activation was observed in the "narrative" condition during the image generation and selection phases, whereas activation was higher in the "divergent" condition during the creative product description phase. In both groups, the divergent condition was also associated with greater functional connectivity, consistent with increased coordination among the cognitive processes involved in generating, exploring, and evaluating creative alternatives. Taken together, these findings indicate that the neural effects of AI interaction may depend on task characteristics and the type of generative support provided, suggesting that the effects of *cognitive offloading* do not appear to be attributable solely to a reduction in individual cognitive effort, but may also reflect different patterns of engagement of the cognitive processes involved in creative production.

From Performance Assistance to Cognitive Collaboration

The coexistence of facilitating and potentially limiting effects of LLMs on creativity suggests that the relationship between generative AI and human creative abilities cannot be understood solely in terms of "enhancement or replacement", but also requires consideration of how human–AI co-creation unfolds and the characteristics of the systems employed. Whereas a system primarily oriented toward task completion tends to prioritize output quality and speed, a system designed to support cognitive engagement should also encourage the development and application of the skills needed to understand problems, explore alternatives, and critically evaluate solutions.

This distinction is particularly relevant in the context of creativity. As highlighted by cognitive models (Mumford *et al.*, 1991), the creative process involves several cognitive operations, including problem definition, idea generation, evaluation of alternatives, and solution development, which may be followed by a phase of practical implementation. These operations do not necessarily follow a linear sequence but may interact recursively through successive phases of exploration, evaluation, and reformulation of ideas in response to the goals and constraints of the task. Human-AI co-creation can therefore be conceptualized as an interactive and dynamic process in which the contributions of generative systems are integrated with human abilities to guide exploration, interpret suggestions, and evaluate their relevance. Evidence suggests that generative AI tools can support different stages of the creative process, particularly by facilitating the exploration of alternative per-

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spectives, information retrieval and synthesis, problem reformulation, brainstorming, idea organization, and the rapid generation of multiple solutions (Chompunuch & Lubart, 2025). The contribution of generative AI changes as the creative process moves from ideation to the practical implementation of solutions, a stage in which practical constraints, contextual complexity, domain-specific technical expertise, and the need to assess the feasibility of proposed solutions become particularly important. Accordingly, AI assistance can support planning and the evaluation of alternatives, while human experience, contextual knowledge, and judgment remain essential for guiding collaboration and translating ideas into feasible outcomes (Chompunuch & Lubart, 2025).

Another fundamental aspect concerns the need to maintain effective human oversight in AI-assisted creative processes. Although generative systems enable the rapid production of numerous alternatives, the quantity and novelty of these suggestions do not necessarily guarantee their quality, relevance, or feasibility, while the linguistic fluency of AI-generated content may create a misleading impression of accuracy and reliability (Chompunuch & Lubart, 2025). From this perspective, the *human-in-the-loop* principle becomes particularly relevant, emphasizing human involvement in the operation and oversight of AI systems (Monarch, 2021). Human–AI co-creation therefore requires active and informed human involvement, ideally supported by the knowledge and skills needed to critically evaluate, refine, or reject AI-generated outputs, thereby preserving human control over the creative process and responsibility for final decisions.

Conclusions

Available evidence suggests that the benefits of LLMs for the quality of creative outputs may be accompanied by less favorable effects, such as greater convergence of ideas and limited transfer of these benefits to independent performance. At the neuroscientific level, initial studies on LLM-assisted writing have identified differences in patterns of functional connectivity, particularly in the alpha and theta frequency bands, consistent with different patterns of cognitive engagement compared with unassisted writing.

These findings are particularly relevant in educational contexts, where the goal is to develop the skills needed to independently address increasingly complex problems: Effective assistance should therefore support students in completing tasks they are not yet able to tackle independently, while preserving their active engagement in the cognitive processes necessary for learning (Kasneci *et al.*, 2023). From this perspective, human-AI co-creation should support not only the generation of solutions but also the development of exploratory, argumentative, and criti-

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cal evaluation skills. One application of this principle involves using LLMs as tools for critical inquiry, capable of stimulating reflection through questions, counterarguments, and alternative interpretations, while making the underlying assumptions and criteria for evaluating decisions explicit. An example is the *Socratic Challenger*, a workflow proposed by Mikaelyan *et al.* (2026) to support university students in formulating research questions by alternating AI-assisted activities, independent revision, and discussions with instructors and peers. In this approach, AI is not used to provide complete solutions but rather to challenge students' reasoning, encouraging them to clarify their hypotheses, identify potential knowledge gaps, and critically assess the validity of their proposals. The central question, therefore, is not how effectively AI can perform tasks on behalf of individuals, but rather to what extent it can foster the development of their cognitive and creative abilities through forms of collaboration that encourage the exploration of alternatives, critical reflection, and independent judgment.

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