AI as Facilitator of Human-Led Creativity, Creative Partner, or Semi-Autonomous Creative Artefact Generator? The Role of AI in Supporting Creative Processes

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Abstract. Human creativity is multifaceted and highly contextual. This study examines how artificial intelligence (AI) can support creativity in educational settings, guided by two research questions: (RQ1) What is the role of AI in supporting creative processes in education? and (RQ2): Does the effectiveness of AI support for creative processes depend on learners' skills? To explore these questions, we conducted a systematic review of 36 empirical studies. The analysis reveals three distinct roles that AI can play in creative learning: (1) as a facilitator of human-led creativity, (2) as a collaborative partner in co-creativity, and (3) as a semi-autonomous generator of creative artefacts. These roles span a continuum of learner agency and engagement in the creative process. While AI can support both divergent and convergent thinking, its pedagogical value largely depends on the learner's ability to regulate its use and maintain creative control. We introduce the concept of co-creative AI fluency to describe the competencies needed to work with AI as a creative partner. This framework offers educators a foundation for integrating AI into creative learning environments while preserving both learner and teacher agency.

Keywords: Artificial intelligence, creativity, creative engagement, co-creative AI fluency

1. Introduction

Creativity is increasingly recognised as a key skill, distinguishing human work from that of robots in an era of growing automation and AI [1]. Florida [2] argues that creativity divides modern societies into *creative classes* and non-creative workers. In knowledge-based societies, jobs in the creative class are vital, as they require high levels of independent judgement and education. Therefore, fostering creativity is crucial in 21st-century education, and AI

tools should support both academic and professional creativity development. In this context, teachers face challenges in helping students develop 21st-century competencies while also understanding how AI can enhance the teaching and learning activities. The rise of generative AI tools like *ChatGPT* has highlighted the need for educators to grasp AI's role and regulate its use in education. Creativity, as one of the 4Cs competencies, is linked with critical thinking, which depends on human judgement, context, and cultural understanding. Creativity has been described as a process involving various stages of divergent and convergent thinking accompanied by acts of problem solving, exploration, and iteration [3]. In the Horizon AugMENTOR project [4], we aim to foster creativity by identifying the different roles that AI can play in supporting human creativity in education. To achieve this, the present study investigates two core research questions that guide our analysis: (RQ1) *What is the role of AI in supporting creative processes in education?* and (RQ2) *Does the effectiveness of AI support for creative processes depend on learners' skills?*

2. Typology of AI roles in Human Creativity in Education

The diversity of the role of Artificial Intelligence (AI) in creative processes follows a continuum of learner agency, from lower agency to the highest agency as can be seen in Fig 1. Lower levels of human agency can be observed when the learner uses AI as a generator of an outcome or solution, delegating the intended human creativity to the generative AI tool to create a text, image, video, or other type of creative result. In the highest levels of agency, the AI is used to support certain creative stages with a high regulation from the learner, without delegating creative control to the AI system.

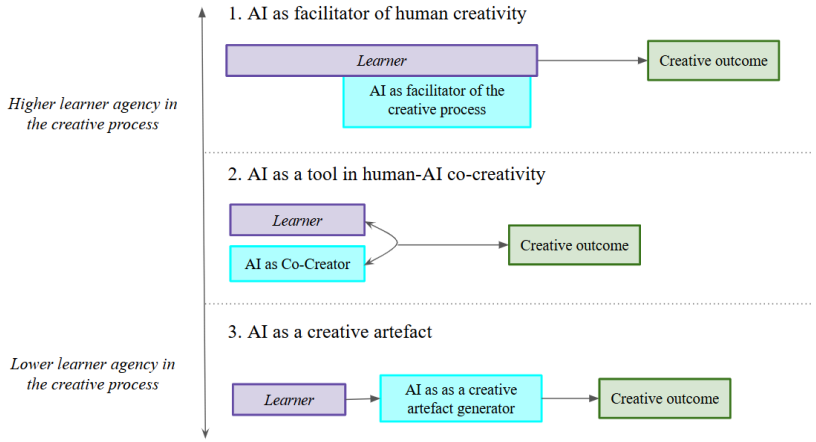

Fig. 1. Three typologies of AI support for creative processes in education

The categories distinguish three primary modes in which AI can support human creativity: AI as facilitator of human-led creativity, AI as co-creator, and AI as a semi-autonomous creative artefact generator. In figure 1, the lowest learner agency is represented in *Category 3* and the highest learner agency in *Category 1*.

2.1. *Category 1*: AI as a Semi-Autonomous Creative Artefact Generator

In this category, AI is used to delegate a creative task, producing creative outputs such as art, music, or written content. In this model, the learner assumes a more passive, evaluative role, assessing and reflecting on the creativity of the solutions and artefacts generated by the AI. While this mode may minimize human creativity to the act of prompting in the generative phase, it still can engage the learner in a later stage of convergent thinking if the learner interrogates the result through analysis and reflection. Nonetheless, in this typology of use, learners may delegate some aspects of the creative process to AI-based tools without engaging in the metacognitive regulation of the creative processes. Figure 2 illustrates AI as a semi-autonomous creator of artefacts in its position between the learner and the desired creative outcome.

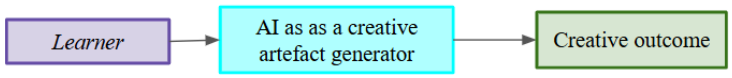

Fig. 2. AI as a Semi-Autonomous Creative Artefact Generator.

2.2. *Category 2*: AI as a Partner in Human–AI Co-Creativity

In this category, creativity emerges from an interactive partnership between human and AI-based tools (Figure 3). The learner collaborates directly with AI as a co-creator, with AI contributing to tasks such as music composition or image generation. This mode exemplifies shared authorship, where creative agency is distributed between the human and AI, forming a dynamic feedback loop. The collaborative nature of this relationship supports the development of new creative modalities, challenging traditional notions of authorship and originality.

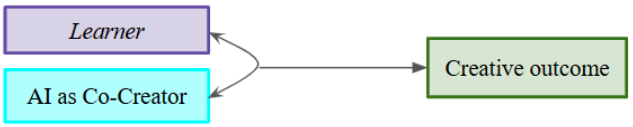

Fig. 3. AI as a Tool in Human–AI Co-Creativity

2.3. *Category 3*: AI as a Facilitator of Human-Led Creativity

In this category, AI supports and enhances the learner's creative potential by facilitating ideation, adaptation, or the selection or refinement of outcomes or solutions (Figure 4). In this configuration, the learner maintains a high degree of agency in the creative processes. The learner retains primary agency in the process, with AI serving as an enabler rather than a generator of creativity. This approach underscores the pedagogical potential of AI in education, where AI can support creative tasks without overtaking the learner's role. However, this AI role requires the learner to have developed a high level of regulation but also an understanding of the AI's potential at specific stages of the creative task [5].

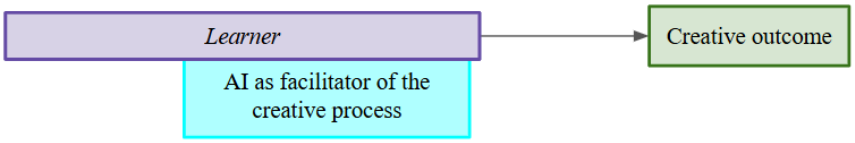

Fig. 4. AI as a Facilitator of Human-Led Creativity

The learner initiates the creative process through a creative initiative, which transitions into the preparation phase, where prior knowledge, goals, and context are aligned. This leads to idea/response generation where AI can support divergent thinking [3,11]. Once ideas are generated, the process continues into idea/response evaluation, involving convergent thinking.

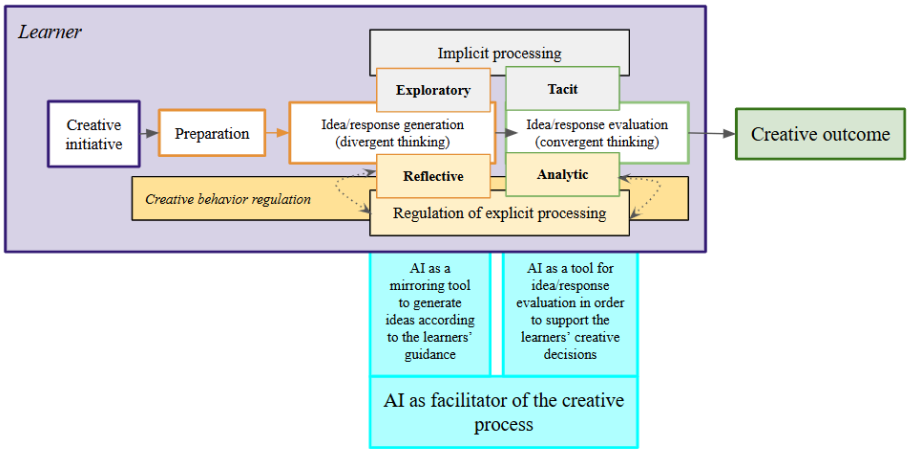

Fig. 5. AI as a facilitator in divergent and convergent thinking stages of the creative process

In Figure 5, we can observe the role of AI as a facilitator with dual-facilitating capacity, for idea generation (*divergent thinking*) and creative decision support (*convergent thinking*) [3, 5]. In the *AI role of facilitator for divergent thinking*, AI acts as a mirroring agent, generating ideas based on learners' prompts or

directions [6]. This supports the exploratory phase by expanding creative possibilities without overpowering learner agency. AI, in this role, aligns with the learner's intentions and metacognitive control of the creative processes. In the *AI role facilitator for convergent thinking*, AI assists in evaluating and refining ideas. This function is particularly useful during the analytic phase, where learners must select and refine the most promising ideas for the final outcome, while maintaining the learners' regulation of the creative processes.

3. Methodology

The study is based on a PRISMA review conducted through the ScienceDirect database. The primary search terms included "creative" OR "creativity" OR "divergent thinking" as well as "AI" OR "artificial intelligence" and "education". The query was restricted to the last three years (2023-2025). Initially, this search produced 121 research articles, which we then reviewed by reading the abstracts or the full text. After excluding the papers which did not meet the criteria, we analysed 36 papers. For each paper, we identified the different levels of creative engagement, considering not only the learners' and teachers' perspectives on it but also the domain of application and the educational level of the study. Studies in which both learner and teacher activities are supported are also integrated as two separate entries to consider the level of AI's role in the support of creative activities.

4. Results

We begin by presenting the results addressing (RQ1) *What is the role of AI in supporting creative processes in education?* Through our analysis of 36 empirical studies, we identified three distinct roles that AI can play in educational creative activities. These roles form the basis for categorizing the studies included in our review. An overview of this classification is provided in Table 1.

Table 1. Research papers according to the typology of AI's role in the creative process.

Typology of AI's role in the creative process	**References**

AI as facilitator of human-led creativity [6-18]	Baltà-Salvador et al. [7]; Benvenuti et al. [18]; Celiktutan et al. [8]; Habib et al. [9]; Jeremiah [10]; Krakowski [11]; Mei et al. [12]; Patac & Patac [13]; Sankar & Sen [22]; Sreenivasan & Suresh [14]; Urban et al. [15]; Urmeneta & Romero [6]; Vinchon et al. [16]; Zhu et al. [17]
AI as a collaborative partner in human-AI co-creativity [19-21, 23, 25-26]	Ivcevic & Grandinetti [19]; Jia et al. [26]; Mishra & Henriksen [20]; Riemer & Peter [21]; Yu [23]; Zhou et al. [25]
AI as a semi-autonomous creative artefact generator [12, 26-28]	Colton & Wiggins [28]; Huang et al. [27]; Jia et al. [26]; Mei et al. [12].

Table 1 categorises the reviewed studies according to the role of AI in supporting creativity in education. Among the reviewed studies, 22 described the role of AI in educational contexts, while 14 considered creativity without integrating it. The systematic review of the 22 studies integrating AI to support creativity identified three distinct categories in the typology of uses of AI to support creativity in education. In the case of Jia et al. [26], we observe two roles instead of a single one.

In *Category 1*, *AI as a facilitator of human-led creativity* appears in 12 studies [6-18]. Baltà-Salvador et al. [7] explored the influence AI had on the creative ideation of third-year engineering students obtaining their degrees in industrial design (n=51). This study explored whether AI supported or hindered the creative process and revealed that prior experience with AI tools had a larger impact on ideation outcomes than whether AI tools were used at all. In relation to the divergent thinking support, different studies identified the role of AI when supporting the ideation and exploratory stage of creativity, where users generate solutions in an informal and low-risk way. Here AI has shown promise in supporting divergent thinking by reducing cognitive load, facilitating access to diverse perspectives, raising self-efficacy, and encouraging creative exploration [12-13, 15]. Studies have also noted how AI is able to uncover unexpected but meaningful connections that humans alone might miss [24]. Utilising its training on large datasets of diverse knowledge, AI also has the potential to remove cognitive bottlenecks, freeing up user's working memory for more creative ideation [12, 22]. While AI can help expand the range of ideas and perspectives available to users, it has also shown utility in helping users analyse and evaluate creative solutions using convergent thinking. Convergent thinking is important to the creative process as it is often associated with turning a multitude of creative possibilities into actionable solutions [11]. In this context, chatbots, writing assistants, and

intelligent tutoring systems can help users organise, revise, and optimise ideas generated through the divergent thinking process. In Urban et al. [15], they engaged 145 students in creative problem solving tasks such as decision-making dilemmas, case study analysis, essay writing, and engineering problems. These tasks, where some students had access to *ChatGPT* and others did not, included both divergent and convergent thinking processes. The study showed that students reported increased confidence in being able to successfully resolve creative problem-solving tasks and improved on-task self-efficacy with the use of AI tools.

In *Category 2, AI as a collaborative partner in co-creativity,* we identify six studies [19-21, 23, 25-26] where AI acts as an active partner in the creative process. The study by Ivcevic and Grandinetti [19] considered AI's potential to support the four levels of creativity, from creativity in the context of learning to domain-changing innovation, by reviewing the existing body of research through various contexts and domains. When functioning as a co-collaborator, AI becomes more actively involved in the creative process. In this role, AI can support creativity by reinterpreting user inputs into new ideas, encouraging reflection by questioning user assumptions, and contributing to the creative process through creative dialogue [23, 25].

In *Category 3*, *AI as a semi-autonomous creative artefact generator,* we identified four studies [12, 26-28]. Huang et al. [27] explored the role AI can play in the design ideation process for product design students of varying levels of competency. The study of Jia et al. [26], which explored the effect AI has on employee creativity, showed that AI can support improved customer interactions and encourage positive emotions at work. These benefits were skill dependent, with higher-skilled employees achieving more creative solutions and desirable outcomes. From this analysis, we can identify that lower-skilled employees delegated the creation of answers to AI without regulating the outcome provided by the AI system. In this context, we can observe that the use of AI, either as a semi-autonomous creative artefact generator (*Category 3*) or as a collaborative partner in co-creativity (*Category 2*), depends on the skills of the workers. These findings also offer insight into RQ2 (*Does the effectiveness of AI support for creative processes depend on learners' skills?*) by showing that the effectiveness of AI support in creative processes is tied to the learner's skills, particularly their ability to regulate, evaluate, and adapt the use of AI tools.

5. Discussion

Our systematic review identified three distinct roles in relation to RQ1: AI as a facilitator of human-led creativity [6-18] where AI supports human creative ideation through the use of chatbots, text-to-video generators, and layout or design applications, AI as a collaborative partner in co-creativity [19-21, 23, 25-26] where AI acts as an active partner in the creative process blurring the contributions of both humans and machines in the final creative outcome, and AI as a semi-autonomous creative artefact generator [12, 26-28], where humans take a passive role in the creative process ceding much of their creative agency to AI. Through the analysis, we have observed that these three types of AI support varied roles in the creative process revealing that AI's involvement is not monolithic but dynamically distributed across multiple phases of the creative task, including ideation, development, and finalization. AI has the potential to augment, enhance, or even generate content, challenging traditional conceptualizations of creativity and technological mediation. However, this potential should be regulated by the learner. Within a high regulation perspective, the learner engages in the use of AI while maintaining their agency and capacity to regulate the process (*Category 1*: AI as facilitator of human-led creativity), but the learner can delegate part of this process to AI when engaging in human-AI interactive creative process (*Category 2* : AI as a collaborative partner in co-creativity) or can delegate the creative process to AI (*Category 3*: AI as a semi-autonomous creative artefact generator).

Our study also addressed the influence of learners' skills in the support of AI for creative processes (RQ2). In each of these categories, AI's contribution to the creative process depends on the agency and regulation of the learner. As AI takes on different roles, ranging from facilitator to creative partner, the level of learner agency and creative control becomes increasingly important. Learners who demonstrate strong self-regulation and creative competence are better equipped to engage meaningfully with AI. As AI takes on different roles, ranging from facilitator to creative partner, the level of learner agency and creative control becomes increasingly important. Learners who demonstrate strong self-regulation and creative competence are better equipped to engage meaningfully with AI. When AI acts as a facilitator of human-led creativity (*Category 1*), agency remains high as humans occupy the lead role in driving the creativity processes. In the second category in which AI is a partner in human-AI co-creativity, human effort is also considered high, with users doing most of the creative work and AI providing assistance at key junctions. This changes when AI takes on the role of a semi-autonomous creative artefact generator (*Category 3*) and reveals aspects of creativity on par with human efforts. Here ownership of the creative process is blurred as both human and machine lend key strengths to produce

something novel and useful. This typology reduces human agency, but it also reduces human effort, a tradeoff that may be considered worthwhile in certain domains and contexts. Finally, when AI acts as a semi-autonomous generator of creative artefacts, human agency is viewed as being very low, given that much of the creative work is offloaded to machines with humans taking on the role of evaluators. In this role, humans expend less effort during the creative process. The ongoing question of effort in evaluating creativity is also one of context, as there may be worthwhile tradeoffs in ceding more or less agency to AI.

While the studies reviewed have shown some potential associated with the inclusion of AI in the creative process, we identified gaps in the literature review and challenges. In relation to these gaps, this review highlights a dearth of research evaluating the roles of AI in support of creativity in K12 settings. The majority of research currently focuses on higher education (HE), primarily in specific contexts such as science, technology, engineering, and mathematics (STEM) subjects or creative writing. Given the vast differences between K12 and HE students, further research needs to be undertaken in K12.

The long-term impact of AI on learners' creative development presents important considerations, including the risk of deskilling and diminished agency through prolonged reliance on AI tools [11, 12, 17]. Additionally, the role of AI in creativity may differ across cultural and linguistic contexts, where values and norms shape how human-AI collaboration is perceived [29]. As AI frequently performs hybrid or shifting functions within a single creative task, there is a need to refine existing frameworks to better capture the fluidity of human-AI interaction in educational settings [6, 20, 23].

Questions regarding bias and transparency are also relevant given the nature of the training required to build LLMs on large corpora of proprietary work. This work is often uncited or unattributed by AI tools, leaving users to guess if and when aspects of AI's contribution might stray into the realm of plagiarism. These issues have also led to dissenting views on whether AI is capable of exhibiting creativity [3, 28]. Furthermore, the most popular LLMs are primarily trained on content generated through the lens of Western sensibilities and expressed predominantly in English [29].

6. Conclusion

Educators play a critical role in defining the relationship between AI use and student creativity. Rather than perpetuating the narrative of AI as a shortcut to creative outcomes, educators can frame AI as a catalyst for creative ideation and iteration while ensuring that students remain at the centre of the creative process. This process will require sustained AI literacy as well as the

development of pedagogical frameworks that can scaffold emerging skills such as co-creative AI fluency, a term we propose to describe both the mutuality and skill required to collaborate with AI-based agents. These core competencies include the cognitive, technical, metacognitive, and ethical skills necessary to engage with AI intentionally, sustainably, and reflectively. Technical skills, creative thinking skills, and ethical awareness are needed for using AI as a collaborator in human-AI co-creativity (*Category 2*). In addition, metacognition and regulation are required for the use of AI as a facilitator of human-led creativity (*Category 1*). Table 2 shows these core skills in more detail.

Table 2

Core competencies in the use of AI as a partner in human-AI co-creativity (Category 2) and AI as facilitator of human creativity (Category 1)

← ← ← ← **AI as facilitator of human-led creativity** → → → →			
← **AI as a collaborator in human-AI co-creativity** →			
Creative Thinking Skills	**Technical Skills**	**Ethical Awareness**	**Metacognition and Regulation**
- Prompt Design and Refinement [7, 22] - Divergent thinking with AI [8, 9, 13, 15] - Convergent thinking with AI [11, 26] - Analogical Reasoning - Iterative Co-creation [6-7, 20, 23, 25]	- Data Literacy - Human-AI Interaction [7, 8, 10, 16, 17, 18, 20, 21, 23] - Multimodal Tool Proficiency - AI System Literacy [10, 18, 26] - Pattern Recognition [21]	- Bias and Plagiarism Awareness [6, 7,10, 14, 17, 24, 29] - Sociocritical thinking [8] - Cultural and Linguistic Sensitivity [29]	- Metacognition [5, 7, 8, 11, 13, 15, 20, 23, 25] - Agency [10, 11, 20, 28, 29] - Self-Regulation [5, 7] - Co-Regulation - Socially Shared Regulation

The development of these competencies will necessitate a multidisciplinary approach requiring experts in fields beyond education. In these cases, careful attention should be paid to ensure that the intent and goals of the educational process are not lost in superficial use cases. Given the relative newness of AI's commercial availability, there is a need for further longitudinal studies to

assess AI's impact on creativity in education over time, particularly with regard to human agency, deskilling, and questions of authorship and originality. AI can support aspects of the creative process, but its use is both nuanced and evolving. To ensure that human creativity is preserved, and indeed valued, educational frameworks and policies must frame AI not as a substitute for creative effort, but as a tool for ideation, reflection, and innovation.

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