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Learner–Generative AI Co-creation: Toward New Forms of Collaborative Learning

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Abstract:

This article analyzes the evolution of collaborative learning in higher education through the lens of co-creation between the learner and generative AI (GAI). By positioning GAI as a "cognitive partner," this technology transforms educational interactions by facilitating processes of mediation and knowledge structuring. The study identifies the key determinants of this effectiveness, such as student autonomy, task complexity, and the value placed on the learning process, and highlights five new learning modalities: content co-creation, the iterative approach, co-exploration, collaborative discussion, and guided self-assessment. These hybrid forms generate specific artifacts (prompts, syntheses, metacognitive traces) that support cognition. In conclusion, the integration of GAI represents a powerful lever for the co-construction of knowledge, provided that a critical stance is maintained and future empirical validations are conducted.

Keywords: Co-creation, Learner, Generative AI, Collaborative Learning

1. Introduction:

In the digital era, individual learning has evolved through three major stages. The first, that of programmed instruction, relied on predefined pathways and interaction with basic instructional units, but proved limited due to the lack of immediate assistance when difficulties arose. The second stage corresponds to the emergence of online learning platforms, which introduced social interaction tools (forums, wikis, etc.), fostering the co-construction of knowledge and a strengthened collaborative dynamic. Finally, the third stage, overlapping with the previous one, is marked by the rise of generative artificial intelligence tools, now considered cognitive partners in learning processes. These technologies offer new opportunities for content production and cognitive support, but they remain limited by the quality and availability of data, which can generate biases or errors (Le Cerf, 2023: 86).

In higher education, this evolution is reflected in a dynamic of co-creation between students and generative AI. The process relies on continuous interaction: formulating requests, generating responses, and then critically validating them by confronting bibliographic sources and correcting the content. This approach helps strengthen critical thinking and information literacy skills, while placing the learner in an active position of knowledge regulation. In conclusion, the learner is called upon to

rethink their methods of learning and collaboration in light of the evolution of generative AI, which leads to a central question: what new forms of collaborative learning are emerging from this interaction?

In this article, based on a structured literature review, we address two major themes: on the one hand, we analyze the impact of the interaction between the learner and generative artificial intelligence on collaborative learning practices, highlighting the transformations it brings to pedagogical dynamics. On the other hand, we examine the role of generative AI as a cognitive partner, capable of redefining the modalities of knowledge co-construction and opening new perspectives for higher education.

To analyze more precisely the connections between human creativity and the creativity produced by generative AI, this reflection chooses not to explicitly address collective human creativity. The focus is thus placed on the determinants and mechanisms specific to individual creativity, considered the most relevant framework for examining the interactions between human capacities and algorithmic generativity.

2. Theoretical Framework:

2.1. Producing Knowledge with Generative Artificial Intelligence:

Unlike traditional computing, which focuses on automating repetitive tasks, generative artificial intelligence (AI) aims to reproduce certain forms of human intelligence by automating the production of content and knowledge (Bourgois, 2023: 72). It represents a major technological development, enabling the generation of texts, images, or sounds from vast datasets, often derived from Big Data.

The effectiveness of these systems relies on their training on large volumes of textual data (Saporta, 2023: 42) and on principles drawn from linguistic analysis, particularly distributional semantics. According to this approach, the meaning of a word emerges from the statistical regularities observed in its lexical environment (Gefen, 2023: 18). By exploiting these correlations, AI builds semantic representations that it mobilizes to produce original content consistent with the linguistic and syntactic structures it has learned.

2.2. Learner–Generative AI Co-creation:

The prefix "co"[1] refers to "creating with," thus co-creation between the learner and generative artificial intelligence designates a process in which the production of knowledge or digital artifacts results from a dynamic interaction between human creative capacities and the generative potential of AI. It goes beyond a logic of simple technological assistance and instead fits within a truly collaborative framework, where AI becomes a cognitive partner contributing to the exploration, formulation, and transformation of ideas.

This approach assumes a paradigmatic shift, moving from individual or cooperative modes of action to an integrated collaborative ecosystem. Within this system, interactions between human and non-human agents converge toward the co-construction of digital artifacts, thereby embedding learning within a dynamic of shared creation.

Moreover, the learner's creativity is structured around a conceptual triad comprising resources, cognitive and methodological skills, and engagement (Farzaneh, Boyer & Pitrone, 2024). In this configuration, the quality of the communicational interaction between the learner and generative AI constitutes a sine qua non condition for the co-creation process.

2.3. Learning Artifacts Resulting from Learner–Generative AI Co-creation:

The term “artifact” is often associated with that of a technical object, although several authors emphasize that its scope extends beyond a strictly technocentric dimension (Garçon, 2022). Garçon shows that the artifact makes it possible to adopt an anthropocentric perspective by integrating the multiple relationships that the subject maintains with an object or an anthropotechnical system, whether it is a technical structure, an operational device, or an instrument.

From this perspective, emphasis is placed on the info-communicational dimension of digital artifacts, which play a structuring role in individuation dynamics by shaping the modes of access, circulation, and construction of knowledge. Digital technologies, considered as artifacts carrying meaning for the social actor, acquire their significance through the modes of knowing and the human–machine interactions that shape them (Koleva, 2025: 20).

In the context of this research, the learning artifacts resulting from co-creation between the learner and generative artificial intelligence refer to all productions jointly developed by these two actors whether texts, diagrams, summaries, or other forms of content. These artifacts constitute cognitive mediations that support processes of exploration, experimentation, structuring, and consolidation of knowledge. Through their interaction with AI, learners mobilize these productions as intellectual instruments that facilitate the elaboration and refinement of their knowledge.

Endowed with advanced computational capacities that enable it to automatically generate a variety of content, generative artificial intelligence constitutes a cognitive artifact in its own right. It fits within an info-communicational dynamic where human–machine interaction becomes a central device for mediation, structuring, and co-elaboration of knowledge (Garçon, 2022, cited in Koleva, 2025: 21).

2.4. Collaborative Learning as a Response to the Limits of Traditional Models:

In the digital age, learning has progressively evolved from a model of programmed instruction, centered on the sequential transmission of codified knowledge, toward more interactive systems. Although individual access to printed or digital content enables an initial appropriation of knowledge, it remains limited by the absence of exchanges when comprehension difficulties arise. As several studies have shown, knowledge construction cannot be reduced to a solitary activity; it requires social and collaborative interactions.

It is from this perspective that the phase of the platformization of education emerged, characterized by the integration of digital platforms such as Moodle, offering not only pedagogical resources but also spaces for communication and collaboration between learners and instructors, in line with socioconstructivist approaches (Baskara, 2024; Zhou & Schofield, 2024).

3. Interaction Between Learner and Generative AI: What Does the Literature Review Reveal?

3.1. Generative AI as Support for Collaborative Learning:

Generative artificial intelligence (GAI) constitutes a pedagogical actor capable of strengthening collaborative learning in higher education (Zhou & Schofield, 2024; Kasneci et al., 2023; Rasul et al., 2023; Ruiz-Rojas, 2024; Pavlik, 2023; Li et al., 2024). The roles and contributions of GAI in this context manifest as follows:

Support for the Co-construction of Knowledge:

GAI actively facilitates the co-construction of knowledge by reformulating ideas, proposing relevant examples, and helping structure arguments. Its abilities in synthesis, simplification, and translation

enhance access to information, reduce linguistic and cognitive barriers, and enable more equitable participation among students.

Personalization and Engagement:

AI promotes personalized pedagogical support by providing explanations and suggestions tailored to individual needs, while strengthening collective motivation and engagement. Its capacities for synthesis and simplification reduce linguistic and cognitive obstacles, thus fostering more equitable student participation and improving access to information.

Development of Skills and Task Management:

GAI acts as a co-creator, a feedback agent, and a critical assistant, contributing to the development of essential collaborative skills (communication, coordination, problem-solving). It optimizes the management of complex tasks by organizing group work, generating initial lines of inquiry, and analyzing final outputs.

3.2. Determinants of the Effectiveness of Collaborative Learning:

In the context of this study, which focuses on hybrid collaboration between the learner and generative artificial intelligence, we posit that the effectiveness of collaborative learning cannot arise from interaction alone. Rather, it stems from a complex articulation of various structural, interactional, and contextual variables (Baskara, 2024; Zhou & Schofield, 2024).

Student Autonomy as a Key Determinant:

Student autonomy emerges as a major determinant of the effectiveness of collaborative work, expressed through the ability to make thematic choices and to engage in decision-making processes, which catalyzes individual responsibility and collective ownership of the project. This dynamic aligns closely with the paradigm of social constructivism, in which learning is no longer conceived as passive reception but as a process of co-constructing knowledge resulting from constant dialectical interactions between the learner, peers, and the educational environment.

A Demanding, Open, and Intellectually Stimulating Task:

The effectiveness of collaborative learning depends largely on the richness and complexity of the task to be accomplished, as well as on the possibility of producing a creative and original outcome. Such tasks both open and demanding promote active learner engagement and significantly reduce the emergence of passive behaviors.

Valuing the Learning Process:

A notable point lies in the fact that the student placed greater importance on their own progress, on the quality of the productions created, and on the sense of accomplishment generated by collective work, rather than on evaluative outcomes or the grades obtained.

Personalization and Individual Preparation:

Optimizing collaborative practices requires taking into account the learner's individual characteristics, such as their pace of acquisition or cognitive style. This personalization necessarily aligns with a preparatory phase focused on mastering fundamental knowledge, a sine qua non condition for accessing the higher taxonomic levels described by Bloom (synthesis, evaluation). Thus, the consolidation of prior learning potentially facilitated by AI-mediated support constitutes an

essential prerequisite for ensuring the relevance and effectiveness of subsequent collective interactions.

Integration of a "Cognitive Partner" (AI as a Stakeholder):

The emergence of generative artificial intelligence reshapes the learning dynamic by establishing technology as a true "cognitive partner" and a stakeholder in the educational process. This new agent contributes to the effectiveness of collaborative work through a dual function: on the one hand, it provides continuous scaffolding, comparable to that of a "critical friend", by offering personalized feedback and facilitating cognitive or linguistic remediation; on the other hand, it integrates into co-creation mechanisms as a virtual collaborator capable of stimulating ideation and substantially enriching the materials submitted to the group's collective intelligence.

3.3. Typology of Forms of Collaborative Learning:

The different forms of learning identified stem both from the theoretical contributions found in the scientific literature and from observations drawn from my own professional and pedagogical experiences.

3.3.1. Co-création des contenus :

L'apprenant engage avec l'IA générative une activité de production textuelle relevant d'une «écriture hybride», dans laquelle les contributions humaines et algorithmiques s'entrelacent. Dans ce cadre, la créativité de l'apprenant n'est pas affaiblie, mais au contraire renforcée, dans la mesure où celui-ci mobilise des processus métacognitif visant à contrôler, vérifier et ajuster les propositions générées par le système. Cette dynamique correspond à une «co-création Humain-IA», entendue comme un processus collaboratif où les deux agents interagissent pour élaborer conjointement des contenus, des idées ou des solutions. L'IA agit ici comme un tuteur ou un éditeur critique (Bourgois, 2023 ; Jeunesse, 2025 ; Ruiz-Rojas et al, 2024 ; Pozdniakov et al., 2025).

Associated Artifacts:

According to these authors, the main artifacts mobilized in this modality of collaborative learning can be identified as follows:

Within the Human–AI co-creation paradigm, learning artifacts unfold through a dynamic interplay between hybrid textual productions and supports for metacognitive regulation. The former materialized in co-developed educational resources (such as multiple-choice questions, from draft to final version) result from discursive iterations initiated by prompts, forming the tangible foundation of the collaboration.

The latter essential for reflexivity and epistemic validation include structured AI feedback, syntheses, diagnostics, and improvement recommendations, as well as the learner's self-evaluation and revision traces, thereby objectifying the critical control processes required for the qualitative refinement of the knowledge produced.

3.3.2. Iterative Learning and Knowledge Appropriation:

The interaction between the learner and a generative AI can facilitate iterative learning and the appropriation of knowledge, conceived as a recursive process that engages the student in cycles of successive adjustments (statements, options) guided by feedback. AI stimulates creativity and the diversification of conceptual prototypes. Finally, collaborative refinement constitutes the

optimization phase, in which the learner and generative AI provide regulatory scaffolding aimed at polishing and qualitatively validating the resources produced.

However, the use of these systems requires an active and critical role from the learner, who must systematically verify, confront, and validate the generated responses. This control-oriented approach contributes to making access to large volumes of information more structured, while strengthening the quality of the cognitive processing involved.

Associated Artifacts:

The learning artifacts associated with processes of understanding and knowledge appropriation can be described as follows:

Interactions between the learner and a generative AI give rise to a variety of learning artifacts, among which one finds "verification and validation traces" related to the critical control of generated responses, as well as "synthesis notes" and "summaries" produced from the structured information provided by the AI.

The active use of the tool also leads to the production of "learner-formulated questions" aimed at clarifying, deepening, or exploring new concepts, alongside "intermediate written outputs" generated or reworked to respond to complex tasks.

To this are added "metacognitive traces," such as the justification of choices or the evaluation of content reliability, as well as "paths of conceptual exploration and navigation" reflecting the progression of inquiries and deepening made possible through dialogue with the AI.

3.3.3. Co-exploration or Collaborative Inquiry:

Another modality of collaborative learning takes the form of co-exploration or collective inquiry, in which generative AI plays an essential methodological support role. These systems make it possible to identify and organize relevant information, propose analytical avenues, and synthesize large bodies of content. They can also guide the learner in carrying out specific tasks by providing immediate answers to their questions, while facilitating autonomous, gradual, and targeted exploration of knowledge.

Associated Artifacts:

The learning artifacts generated within co-exploration or collaborative inquiry can be characterized as follows:

Co-exploration supported by generative AI produces several learning artifacts, including "lists of structured information" resulting from the identification and organization of relevant content, as well as "analytical pathways and reasoning plans" generated from the directions proposed by the tool.

It also leads to the production of "syntheses and condensations of large datasets," which facilitate a comprehensive understanding of a domain. Added to these are "problem-solving traces" that appear when the learner follows AI-provided methodological guidance to complete a specific task, as well as "questions formulated or reformulated" within the inquiry dialogue, which are essential for deepening understanding.

Finally, exchanges with the AI reveal "autonomous exploration paths," reflecting the sequences of investigation followed by the learner to guide their search for information.

3.3.4. Collaborative Discussion:

Within the learning mode centered on discussion, artificial intelligence plays an essential role in supporting exchanges, enriching interactions, and facilitating communication among learners. Generative AI can provide additional explanations whenever needed and offer real-time guidance, thereby strengthening the quality of pedagogical dialogue.

Associated Artifacts:

The collaborative learning artifacts resulting from discussion unfold as follows: “Content artifacts” provide synchronous cognitive scaffolding, materialized through dynamic definitions, contextual resources, and adaptive reformulations. These elements aim to deepen conceptual intelligibility and remove semantic obstacles within the flow of discourse. “Regulation artifacts” ensure immediate sociocognitive mediation through algorithmic prompts and metacognitive feedback on group dynamics. These mechanisms orchestrate real-time interactions to balance participation and structure argumentative scaffolding. “Production artifacts” objectify collective cognition through the synthetic formalization of exchanges and the consolidation of enriched discursive traces. This process crystallizes the conversational flow into structured knowledge, ensuring the durability and traceability of learning outcomes.

3.3.5. AI-Guided Self-Assessment:

When the learner systematically verifies the responses produced by generative AI, it is because the recurrent use of this technology leads them to adopt a regular critical analysis approach. Interaction with generative AI becomes a reflexive exercise in which the student learns to self-assess, compare, and adjust information before integrating it into their academic work (Gerlich, 2025).

Associated Artifacts:

The artifacts inherent to the modality of “AI-guided self-assessment” are as follows:

The “structured feedback report” constitutes the central artifact of reflexive mediation, supporting the student’s self-assessment through a tripartite architecture:

- a synthetic reformulation designed to verify whether the content has been understood as intended,
- a list of strengths enabling the validation of acquired knowledge through positive reinforcement, and
- a set of targeted corrective recommendations aimed at the multidimensional optimization (writing, methodology, disciplinary content) of the resource.

The “self-assessment form” acts as a metacognitive regulation artifact formalizing the post-feedback validation phase. Within this mechanism, the learner mobilizes the analytical elements provided by the AI to exercise a final critical judgment and definitively determine the quality of their production before submission.

The “iterative educational resource,” materialized in the form of a multiple-choice questionnaire (MCQ), functions as a dynamic production artifact embedded in an incremental logic. It evolves from an initial draft submitted to algorithmic diagnosis (AI) toward a revised version that crystallizes the structural and semantic adjustments made by the learner in response to the AI’s corrective mediation.

The “mediation artifacts,” composed of predefined prompts and scaffolding devices, structure the pedagogical interaction by guiding the dialogue with the AI. While the prompt standardizes the tone

and educational relevance of the generated feedback, the scaffolds activate the learner's epistemic vigilance, fostering the critical engagement necessary to prevent the passive acceptance of potential hallucinations.

Conclusion:

In conclusion, this study highlighted the impact of interactions between the learner and generative artificial intelligence (GAI) on the transformation of collaborative learning practices. It underscores the emerging role of GAI as a cognitive partner capable of redefining the modalities of knowledge co-construction. Our approach integrated a dialectical analysis of the advantages and risks inherent in these technologies, thereby promoting the adoption of a critical stance among learners.

The results show that GAI functions as a lever supporting collaboration and identify the determinants of successful learning. Five collaborative learning modalities resulting from this interaction were characterized: content co-creation, iterative learning and knowledge appropriation, co-exploration (collaborative inquiry), collaborative discussion, and AI-guided self-assessment.

These modalities rely on various learning artifacts that facilitate the cognitive mediations necessary for the educational process. GAI itself constitutes a major transversal artifact. However, the present work has limitations related to the analysis of a non-exhaustive theoretical corpus. Future perspectives will therefore focus on empirical studies involving students in order to apprehend the complexity of the phenomenon in its entirety.

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