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Navigating the Terrain:

Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies

Heutagogy-based Human-AI Co-creation Practice: A Framework for Enhancing Undergraduate Creativity

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The rapid advancements in artificial intelligence (AI) are opening up a complex world where human and AI coexist. It is imperative to develop our understanding of human-computer relationship, and to enhance graduate creativity in order to ensure their competitiveness in a technology-rich world. Recent research has begun to view AI as an independent collaborator and has explored the use of Human-AI Co-Creation (HACC) to foster creativity. However, it remains unclear how HACC practices can be designed to truly benefit undergraduate creativity. The solution to this issue lies in the creation of autonomous learners who can maintain agency in their interactions with AI, aligning with the core idea of Heutagogy. Therefore, this position paper proposes a conceptual framework of HACC for enhancing undergraduate creativity, and explores how the principles of heutagogy can be mapped onto the design of HACC practice.

Keywords: creativity, heutagogy, Artificial intelligence (AI), higher education

Creativity development in today's higher education

The role of generative AI in students' creativity development is far from clear. AI may act as a competitor, reducing students' creative self-efficacy or causing cognitive fixation that inhibits their creative thinking skills (Habib et al., 2024). Alternatively, AI can be a coach that provides tutorials on cognitive processes, strategies and techniques related to creativity (Glăveanu et al., 2019). The ideal relationship would be for AI to act as a collaborator, leveraging each other's efforts and enhancing the value of the output (Vinchon et al., 2023). The term 'human-AI co-creation' (HACC) has been coined to describe a new form of creativity in a technology-rich environment, arguing that collaborations between human and AI may help to augment human creativity (Wu et al., 2021). However, it involves complexities and uncertainties including the influence on student agency (Darvishi et al., 2024), doubts about the conditions or moments that will benefit human creativity, and ethical issues (Lodge et al., 2023). Going beyond a technological innovation in pedagogies identified by many researchers, AI has radically changed in the relationship between higher education and wider socio-economic interests (Bearman & Ajjawi, 2023; O'Toole & Horvát, 2024). It is therefore necessary to investigate the relationship between technology and the long-term development of undergraduates given the rapid advancement of AI, such as effects and conditions of AI-enabled co-creation on their creativity and learning in different environments (Bereczki & Kárpáti, 2021).

In such context, it is far more important for higher education to focus on supporting students to become creative learners, nurturing self-directed learners who can maintain creativity in various situations. Self-regulated learning (SRL) involves learners consciously and proactively managing their learning process to achieve self-determined goals (Zimmerman & Schunk, 2011). Going beyond SRL, heutagogy (self-determined learning) highlights the significance of learners' autonomy and agency throughout the learning process (Blaschke & Hase, 2021). The core ideas of heutagogy are highly consistent with those of creativity. There have been relatively few research that focus on creativity development with heutagogical principles (Cochrane & Munn, 2020), despite their significance for understanding the interplay between SRL and 21-century skills development in technology-rich environment (Blaschke, 2012). The aim of our work is to clarify the potential and design of heutagogy-based HACC practice in enhancing creativity in higher education.

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Conceptual Framework

We explore the concept of creativity from an interactive perspective and apply dialogic theory as the theoretical premise of HACC in promoting undergraduate creativity. Despite the lack of consensus on the definition and measurement of creativity, individual creativity is frequently divided into two processes, idea generation, which contribute to novelty, and idea evaluation which contributes to feasibility (Kaufman & Sternberg, 2019). However, it does not imply that creativity is exclusive to the individual production process. Csikszentmihalyi's (2014) systems model of creativity explains how individuals function as agents within the framework of the cultural production system, including the cultural and social context. Learners select and utilize domain knowledge deemed valuable by social groups as a structure for creative actions, and make creative choices based on their qualities, experiences and endeavors (Csikszentmihalyi, 2014). From this perspective, creativity is understood to occur during interaction between the learner and the external systems that may be interpreted as groups, culture or even the physical environment, e.g., technology. Henriksen et al. (2018) believes technology provides opportunities for individuals to imagine, make and share in creative ways, mediating the process of creation.

Dialogic education theory views technology as the means of expanding dialogic spaces and creativity as the emergence of new perspectives in that dialogue (Wegerif, 2019). In this context, dialogue involves not only the co-construction of knowledge (epistemological), but also an interaction between the self and reality (ontological). Dialogic space refers to the space of possibilities that emerges when two or more perspectives converge and interact in the creative tension of a dialogue. The diversity of learners in terms of domain knowledge, beliefs and cognition shapes dialogic gaps that initiate the social process of creativity (Wegerif, 2019). Generative AI has the potential to facilitate the expansion, diversification and intensification of these spaces where learners can easily find alternative ideas or perspectives for creativity (see Figure 1). Therefore, this framework reveals how AI can extend the existing dialogue space and promote learner creativity.

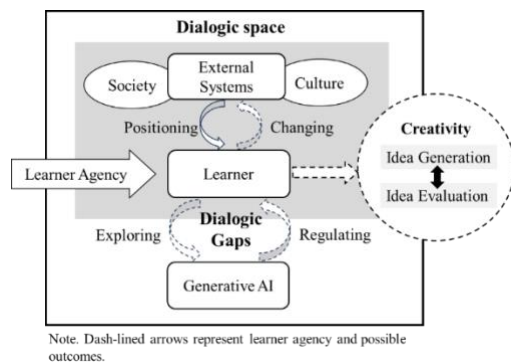


Figure 1. Conceptual framework

As shown in Figure 1, the external system assists the learner in orientating themselves to the valuable direction or structure of creativity, while the learner can autonomously choose required knowledge and conceptualizing in the original space. The interaction between learner and external environment is mediated by learner agency during the HACC practice. Learner as the creative agent is required to derive meaning and value from the output of AI and to make informed decisions for creative purposes (Habib et al., 2024; O'Toole & Horvát, 2024). In the expanded dialogue space, generative AI could provide more dialogic gaps by introducing unexpected information and challenge existing knowledge, thus promoting in depth exploration and regulating learner's further activities accordingly, similar to Vygotsky's zone of proximal development. These dialogues facilitate both creative processes, thereby stimulating creativity.

Heutagogy-based Human AI Co-creation practices

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So far, research into HACC focusses on how AI may function in human creativity. Wu et al. (2021) proposed a circular model of how AI reshapes creative process, including perceiving, thinking, expressing, collaborating, building and testing. Wan et al. (2024) observed how participants collaborated with AI in story writing and slogan writing tasks, which could be broadly categorized into stages of ideation, illumination, and implementation. The process was found to be iterative, stemming from the uncertainty of the AI output. The inaccurate and unexpected responses could prompt users to explore their ideas or novel possibilities that revert the three stages back towards ideation, thereby serving as a fertile ground for creativity. Habib et al. (2024) investigated the negative impact of ChatGPT 3.0 on divergent thinking and creative confidence among university students. They emphasized the need for focused pedagogical strategies in AI-based creativity education, to maintain the symbiotic relationship between human creativity and AI, ensuring that each augment each other. Through these studies, we can identify the realistic possibilities of HACC in promoting creativity and several important concepts that influence HACC practice - self-efficiency, metacognition and learner centeredness. Notably, these concepts are the integral elements of SRL and heutagogy.

Heutagogy was introduced by Hase and Kenyon (2000) to adapt to the nonlinear and unpredictable nature of adult learners' learning in the workplace, which focuses on their autonomy and agency throughout the learning process (Blaschke & Hase, 2021). It embraces a culture of openness and requires learner-managed activities, enabling flexibility and autonomy, which are conducive to creativity (Cowling et al., 2023). Currently, there are few examples of higher education practices based on heutagogy. For example, Cochrane & Munn (2020) designed activities in higher education that support the redefinition level of creativity. Previous research has identified four key principles of heutagogy (see Table 1), including learner agency, self-efficacy and capability, metacognition and reflection, and non-linear learning (Blaschke, 2012). The concepts involved are aligned with lifelong learning skills and are in fact critical aspects for creativity, such as creative self-efficacy, autonomy, competence, and metacognition. Therefore, applying heutagogy in this study may offer a more holistic view for the HACC framework and be adapted to the context of higher education.

Table 1

Heutagogy principles aligned with HACC practice

The core principles of Heutagogy		Application in HACC practice
Learner agency	Learner-centred and learner-determined learning	(a) Learners can control their own creative process, direction and outcome in this context. (b) Before using AI, students should establish creative goals and a preliminary plan. (c) The user has the option to reject or modify content generated by AI, but should not simply copy and paste it.
Self-efficacy and capability	learners' belief of their own ability and whether they can demonstrate an acquired competency or skill in new and unique environments	(a) Students should be the key contributors to the originality and usability of the final creative outcome to enhance their confidence in human-computer co-creation. (b) Encourage learners to develop their creative skills while utilizing generative AI, rather than focusing on specific knowledge or solutions.
Metacognition and reflection	Reflecting upon and critically thinking of new knowledge and the learning path	(a) Promoting critical thinking for AI-generated content, including analysing its accuracy, evaluating its effectiveness, and explaining the rationale for not using it; (b) After the human-computer co-creation, students should reflect on the entire process and explore the most effective way of collaboration.
Non-linear learning and design	The learning path is not pre-defined or sequential, it can often be chaotic and divergent	(a) Encourage individuals to iteratively validate AI-generated information or acquire new knowledge and methods with the assistance of AI.

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In heutagogy, learners need to decide what to learn and how to learn it. Similarly, in creativity, they need to set creative goals and select the appropriate means or sources to achieve them. As illustrated in Table 1, the focus upon learner agency and autonomy in human-AI co-creation is crucial to ensuring the positive effects of AI on creativity development (Yu et al., 2021). They determine not only their own learning process, but also the interaction with the AI. To guarantee individual ownership and decision-making, the degree of autonomy granted to individuals should be commensurate with their capabilities. In this context, the term self-efficacy is used to describe the belief one has the ability to produce creative outcomes (creative self-efficacy), while capability refers to the ability of the learner to contribute effectively to the creative process (Capron Puozzo & Audrin, 2021). Besides, metacognition enables learners to determine when to delegate tasks to AI, thereby ensuring the pivotal role of creativity (Fügener et al., 2022). By reflecting on, monitoring and regulating the co-creation process (Jia et al., 2019), they could plan pathways to achieve self-development goals, selectively incorporating intelligence from the generative AI. The HACC process is non-linear and dynamic, in alignment with the findings of Wan et al. (2024). By analyzing the alignment between Heutagogical principles and HACC, we believe Heutagogy-based HACC practice can encourage university students to engage deeply in creative tasks in an autonomous and proactive manner, leading to significant progress in their creativity.

Conclusions And Next Steps

This paper presents a perspective of HACC that is based on systems views of creativity and dialogic theory. Framing AIs as independent collaborator, we propose a conceptual framework for enhancing undergraduate creativity in HACC and further map heutagogical principles to it. The next step will be to explore Heutagogy-based HACC practices through design-based research. Two cycles of iterative design will be proposed and qualitative (dialogue with ChatGPT and interviews) and quantitative (self-directed Learning and self-assessment of creative performance) data will be collected to evaluate and refine a practical framework.

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