

InsPIRE Insight

AI-augmented heutagogy: A framework for fostering self-determined learning and agency in higher education

By

- Siew Hiang Sally Ng (Institute for Pedagogical Innovation, Research, and Excellence (InsPIRE); Centre for Research and Development in Learning (CRADLE))
- Joel Weijia Lai (Centre for the Applications of Teaching and Learning Analytics for Students (ATLAS), InsPIRE)

Nanyang Technological University

Singapore

KEY IMPLICATIONS

- Generative AI (GAI) should be integrated into higher education not to replace human cognition, but to augment it by fostering learner agency and self-determined learning (heutagogy).
- A structured framework progressing from AI-informed to AI-empowered paradigms ensures learners develop foundational knowledge and complex, creative problem-solving competencies.
- To mitigate "metacognitive laziness," educators must evolve into "cognitive coaches," utilizing reflective practices to develop students' evaluative judgment and ethical literacy.

BACKGROUND

The rapid emergence of Generative AI (GAI) marks a transformative moment for education, offering opportunities for personalised, mastery-based learning while simultaneously presenting significant risks. While AI excels at high-dimensional data processing and speed, it lacks the emotional intelligence, contextual awareness, and ethical reasoning inherent to human cognition. A critical challenge is the potential for "metacognitive laziness", where students offload cognitive tasks to AI, stunting their intellectual growth. Consequently, there is an urgent need for a pedagogical framework that ensures AI serves as a cognitive amplifier rather than a crutch.

FOCUS OF INITIATIVE

This paper proposes a novel AI-augmented heutagogical framework designed to foster self-determined learning. Heutagogy, which emphasises learner agency in curriculum design and assessment, provides the ideal lens for AI integration at higher education level. The initiative aims to align AI's computational capabilities with the development of human

"crystallised intelligence" (accumulated knowledge) and "fluid intelligence" (adaptive problem-solving). The goal is to shift higher education from a rigid, one-size-fits-all model to a flexible, student-centred approach that cultivates comprehensive human development.

KEY OUTCOMES

The primary outcome is a comprehensive design framework that maps AI in Education (AIEd) paradigms against the SOLO Taxonomy (Structure of the Observed Learning Outcome) to guide learner progression:

- **AI-Informed Paradigm (Foundational Knowledge):** AI functions as a diagnostic tool and content provider. This aligns with the *Pre-structural* and *Uni-structural* SOLO levels, where the focus is on acquiring basic concepts and readiness.
- **AI-Supported Paradigm (Critical Application):** AI acts as a collaborator, generating dynamic scenarios and case studies. This aligns with *Multi-structural* and *Relational* levels, where students apply concepts to solve problems and engage in peer review.
- **AI-Empowered Paradigm (Creation & Autonomy):** AI serves as a co-creative research assistant. This aligns with the *Extended Abstract* level, where learners define their own research questions, create multimedia portfolios, and theorise new insights.

Additionally, the framework operationalises **double-loop reflection**, encouraging students to critique not just *what* they learned, but *how* they used AI to learn it, thereby building evaluative judgment.

SIGNIFICANCE OF OUTCOMES

- **Implications for practice:** Educators should transition from content deliverers to "cognitive coaches," interpreting AI analytics to identify learning gaps. The framework introduces practical tools like the **AI-use Declaration Form** and **AI-use Reflection Form** to transform AI usage from a potential integrity issue into a structured opportunity for developing ethical literacy.
- **Implications for policy:** Institutions must broaden their purpose from "building human capital" to "comprehensive human development". This requires developing clear ethical guidelines for AI integration and investing in infrastructure that supports personalised, adaptive learning pathways.
- **Proposed follow-up activities:**
 1. **Faculty Development:** Significant upskilling of faculty is required to navigate the shift toward heutagogical, AI-integrated teaching.
 2. **Infrastructure Strategy:** Strategic investment in AI-enabled platforms (e.g., adaptive tutoring systems) is essential to support the proposed framework.

METHODOLOGY/APPROACH

This work is a conceptual analysis that synthesises principles of Heutagogy (self-determined learning) with the AIED paradigms (Ouyang & Jiao, 2021) and the SOLO Taxonomy (Biggs & Collis, 2014). It adopts the theory of the "extended mind", positing that cognitive processes can be distributed across external tools like AI to amplify human capabilities. The framework was developed by analysing the complementary strengths of human and artificial intelligence.

References

- Biggs, J. B., & Collis, K. F. (2014). *Evaluating the quality of learning: The SOLO taxonomy*. Academic Press.
- Blaschke, L. M. (2012). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *The International Review of Research in Open and Distributed Learning*, 13(1), 56-71.
- Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: The three paradigms. *Computers and Education: Artificial Intelligence*, 2, 100020.
- UNESCO. (2023). *Guidance for generative AI in education and research*. United Nations Educational, Scientific and Cultural Organization.

Link to full article <https://doi.org/10.1080/07294360.2025.2564977>

Contact Dr Sally Ng (sally.ngsh@ntu.edu.sg) for more information about the initiative.