

## **Managing Teaching and Learning Innovation in Higher Education: Reassessing Learner Capabilities in the Era of AI**

Rebecca Liu, Beatriz Rodriguez Garcia, and Stefanos Mouzas  
Lancaster University Management School, UK

### **1. Introduction and Motivation**

The widespread adoption of generative and assistive AI tools in higher education represents one of the most significant disruptions to teaching and learning in recent decades. Tools such as large language models, adaptive learning platforms, and AI-driven accessibility assistants are rapidly becoming embedded in the daily practices of students and educators alike. This shift presents a dual challenge for institutions: how to harness AI's considerable potential to personalise, include, and enrich learning, while guarding against its capacity to undermine the very cognitive and epistemic processes that higher education is designed to cultivate.

This paper presents the design of a study that investigates how AI is reshaping learners' capabilities in higher education, and what this means for managing teaching and learning innovation. The central concern is not simply whether AI improves measurable learning outcomes, but whether it expands or constrains the real opportunities learners have to engage meaningfully, think critically, and develop the capacities they will need beyond their degrees. These are questions of innovation management as much as pedagogy, concerning how institutions design, deploy, and govern AI-enabled educational change in ways that are responsible, inclusive, and effective.

The paper proceeds as follows. Section 2 positions the study within the relevant literature and introduces the theoretical framework. Section 3 presents the research questions and conceptual model. Section 4 outlines the methodology, including pilot activities already underway. Section 5 sets out expected contributions. Section 6 reflects on developmental questions where conference feedback is sought.

### **2. Literature and Theoretical Positioning**

## 2.1 AI in Higher Education: Opportunities and Tensions

Research on AI in education has grown rapidly, with a substantial body of work documenting AI's potential to enhance learning. AI-enabled personalisation can provide adaptive learning pathways, differentiated content, and timely formative feedback that support diverse learners at scale (Layachi & Pitchford, 2025). Accessibility tools, including AI-driven translation interfaces, text-to-speech assistants, and adaptive content generators, offer promising routes to inclusion for learners with cognitive, linguistic, or physical needs (Melo-López et al., 2025; Mulaudzi & Hamilton, 2025).

Yet alongside this optimism, a parallel body of evidence raises important concerns. Research in cognitive science establishes that difficulty and effortful processing are not incidental to learning, rather, they are constitutive of it (Bjork, 1994). When AI tools reduce cognitive load by providing answers, generating drafts, or structuring reasoning on behalf of learners, they may simultaneously reduce the desirable difficulties through which deep learning occurs (Risko & Gilbert, 2016). The phenomenon of *cognitive offloading*, delegating cognitive work to external systems, has been shown to diminish self-regulated learning processes and epistemic agency (Kizilcec, 2024). Compounding these concerns are questions of inequitable access to AI tools, algorithmic bias, data privacy, and the blurred boundary between legitimate AI support and academic misconduct.

What the literature has not yet adequately addressed is a coherent framework for navigating these tensions in the context of innovation management in higher education. Institutions are making consequential decisions about AI adoption without adequate conceptual tools for assessing the trade-offs involved.

## 2.2 The Capability Approach as a Theoretical Lens

This study grounds its analysis in the *Capability Approach* developed by Amartya Sen and extended by Martha Nussbaum (Sen, 1982, 2009; Nussbaum, 2005, 2011). The Capability Approach holds that human development, and educational justice should be evaluated not solely in terms of what people have access to resources, tools, content; but in terms of what they are genuinely able to do and be. The concern is not simply that students use AI (a functioning choice), *but* that over-reliance on AI might erode the underlying capability itself - the genuine ability to reason, engage critically, and learn autonomously. That erosion is the deeper problem the framework is designed to detect and address.

Applied to higher education, this framework reorients the question of AI integration. Rather than asking whether AI improves grades or completion rates, it asks whether AI expands or restricts learners' real opportunities to develop and exercise meaningful capabilities: to reason independently, engage critically with knowledge, take ownership of their learning, and build the epistemic confidence necessary for professional and civic life. This shift from inputs and outputs to substantive freedom is particularly apt for an era in which AI tools can simultaneously widen access and narrow the cognitive space within which genuine learning occurs.

The Capability Approach also foregrounds equity: it insists that all learners, regardless of prior preparation, socioeconomic background, or access needs, should have substantive rather than merely formal opportunities to develop their capabilities. This makes it a productive lens for examining how AI-enabled personalisation and accessibility interact with existing inequalities in higher education.

### **3. Research Questions and Conceptual Framework**

The study is organised around one overarching research question: How does AI integration in higher education expand or constrain learners' capabilities, and what frameworks can guide institutions in managing this innovation responsibly and inclusively?

Three interconnected sub-questions structure the empirical and conceptual work:

- In what ways do AI tools enhance learners' autonomy, engagement, and epistemic agency—and under what conditions do these benefits materialise?
- How and when does AI use lead to cognitive offloading, reduced self-regulation, or diminished critical engagement, and which learner groups are most affected?
- What pedagogical and institutional design principles can help educators and institutions harness AI's benefits while preserving the cognitive and epistemic conditions necessary for deep learning?

These questions are addressed through a three-domain conceptual framework for managing teaching and learning innovation in the AI era. The first domain: *recognition and balance*, concerns identifying and weighing AI's expansive and constraining effects on specific learner capabilities in context. Not all AI tools affect all learners equally, and effective innovation

management requires granular understanding of these differential impacts. The second domain: *inclusive design*, concerns how learning strategies, assessment designs, and AI tool deployments can be structured to maintain cognitive challenge, support self-regulation, and ensure equitable access. The third domain: *AI literacy and reflective practice*, concerns the cultivation of learners' and educators' capacity to engage with AI tools critically and responsibly, including developing judgment about when and how AI assistance enhances rather than substitutes for genuine learning.

These three domains are not sequential but mutually reinforcing: recognition informs design, design shapes the conditions for literacy development, and literacy in turn refines recognition of what AI is doing to learning.

## **4. Methodology**

### **4.1 Overall Design**

The study adopts an exploratory mixed-methods design appropriate to early-stage conceptual and empirical work. The design combines conceptual development with pilot empirical activities, enabling iterative refinement of the framework in light of emerging evidence. This approach reflects the reality that the phenomena under investigation - AI's effects on learner capabilities, are dynamic, context-sensitive, and not yet sufficiently understood to warrant confirmatory testing.

The study is conducted across UK higher education institutions that have introduced generative or assistive AI tools into taught programmes. Participant selection is purposive, with attention to variation across discipline, year of study, and learner background, in order to capture differential capability effects.

### **4.2 Pilot Activities**

Pilot activities are already underway and inform both the refinement of the conceptual framework and the design of the full-scale study. These activities include three complementary strands.

Exploratory surveys have been administered to learners across participating institutions to gather initial data on patterns of AI use, perceived benefits and drawbacks, experiences of autonomy and over-reliance, and awareness of ethical boundaries. Preliminary findings indicate heterogeneous outcomes: some learners reported enhanced clarity, personalised

spacing, and greater confidence in approaching complex material, while others described reduced effort, uncertainty about when AI assistance becomes misconduct, and a sense of diminished ownership over their learning. These early findings reinforce the need for the capability-centred analytical lens the study proposes.

Learner reflections, collected through structured written prompts following AI-assisted learning activities, provide qualitative depth on the subjective experience of AI-mediated learning, attending to how learners narrate the relationship between AI support and their own agency. These reflections are analysed thematically, with codes organised around the three framework domains.

Small-scale classroom implementations of AI-supported learning tools, including adaptive feedback systems and generative writing assistants, have been conducted to observe how these tools interact with pedagogical design in practice. Observations focus on moments of learner decision-making: when learners choose to accept, modify, or reject AI-generated outputs, and what this reveals about the conditions enabling critical engagement.

### **4.3 Full-Scale Study Design**

Building on pilot insights, the full-scale study will integrate semi-structured interviews with learners and educators, longitudinal tracking of AI use patterns and academic development indicators, and case study analysis of institutional AI governance arrangements. Interview data will illuminate the mechanisms through which AI affects specific capabilities; longitudinal tracking will enable assessment of sustained effects over time; case study analysis will connect individual learner experiences to institutional decisions about AI adoption and pedagogy design.

Analysis will be conducted through iterative thematic coding, grounded in the Capability Approach framework, with quantitative survey data used to assess the prevalence of identified patterns across the wider sample. Integration of qualitative and quantitative findings at the meta-inference stage will enable the study to move from contextual richness to transferable guidance.

## **5. Expected Contributions and Implications**

Conceptually, this study advances the application of the Capability Approach to the domain of educational technology and innovation management. It offers a normatively grounded and

empirically tractable framework for evaluating AI's effects on learning that goes beyond efficiency metrics, attending to what learners are genuinely able to do and become. It also contributes to emerging debates about the governance of AI in education by connecting individual capability development to institutional design choices.

Empirically, the study generates original evidence on how AI tools affect different learner capabilities across diverse higher education contexts, with particular attention to the experiences of learners from underrepresented or disadvantaged backgrounds. It provides one of the first systematic examinations of the relationship between AI-enabled personalisation, cognitive offloading, and epistemic agency in higher education.

Practically, the three-domain framework provides concrete guidance for educators, curriculum designers, and institutional leaders seeking to manage AI integration responsibly. It supports decisions about when AI assistance is pedagogically valuable, how to design assessment and learning activities that preserve cognitive challenge, and how to develop learners' own capacity to engage with AI critically. For policymakers, it offers a principled basis for institutional AI governance frameworks that centre learner capability development rather than technological uptake.

## **6. Developmental Reflections and Questions for Discussion**

This paper is submitted as a research design contribution, and several aspects of the project remain in active development. Three areas are especially open to engagement and feedback.

First, the conceptualisation of 'learner capabilities' in AI-mediated contexts requires further specification. The Capability Approach provides a rich philosophical foundation, but translating it into observable and measurable constructs, particularly for the domains of epistemic agency and self-regulated learning, is methodologically non-trivial. The study team is developing a capabilities inventory adapted for higher education AI contexts, and conference input on construct validity and operationalisation would be particularly valuable.

Second, the boundary between AI as a legitimate accessibility tool and AI as a capability-constraining crutch is context-dependent and contested. The study's pilot activities have already surfaced significant variation in how learners and educators draw this boundary. The conceptual framework needs to address this variation without defaulting to either uncritical AI advocacy or technophobic restriction. Feedback on how to frame and operationalise this tension is welcome.

Third, the study's implications for innovation management in higher education institutions—as distinct from individual pedagogy, are still being developed. Questions about how institutional AI governance decisions interact with learner capability outcomes, and what role innovation management frameworks might play in structuring responsible AI adoption, are areas where interdisciplinary input from conference participants would substantially enrich the work.

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