

VISIONS FOR SUSTAINABILITY

Special Issue – Projected publication December 21, 2027

Human Learning in the Age of Artificial Intelligence

Special Issue Rationale

Artificial intelligence has arrived in education with the force of a paradigm shift. Adaptive tutors, generative writing assistants, automated assessment, personalized learning pathways -- the claims are sweeping and the investments enormous. Education ministries, platform companies, and philanthropic foundations are converging on a single proposition: *AI will transform how human beings learn*. What remains largely unasked is whether this transformation is **sustainable**, and what, precisely, we mean by that word when we apply it to learning itself.

This special issue of Visions for Sustainability takes that question seriously. It does not assume the answer is no. But it insists on the full accounting that the question requires: not only whether individual AI tools raise test scores or reduce teacher workload, but whether the broader system of AI-mediated learning is ecologically viable, cognitively responsible, equitable across geographies and generations, and capable of reproducing the human capacities that education is supposed to cultivate.

The issue is built around three main movements:

- **The Claim:** AI arrives in education with extraordinary promises. What does the evidence show about what it does to human cognitive development, learning autonomy, and the capacity for independent thought?
- **The Cost:** What does AI in education consume, and who pays? Energy, water, and material costs are systematically invisible in EdTech discourse. So are the costs to teachers' professional lives, to learners in the Global South, and to the political economy of knowledge.
- **The Question of Alternatives:** What would genuinely sustainable human learning look like? What do hands-on, low-technology, community-rooted, and contemplative approaches offer that AI-mediated instruction does not?

What This Issue Is Not

This is not a technology evaluation exercise. We are not asking which AI tool works best, or how to implement generative AI responsibly in the classroom. Those are legitimate questions, but they are answered elsewhere. We are asking a prior and more fundamental question: is the overall architecture of AI-mediated learning -- as it is currently being built, financed, and

deployed -- *sustainable*? That question requires standing outside the innovation cycle rather than accelerating it.

Contributions may be empirical, theoretical, or cross-disciplinary. We particularly welcome work that bridges natural and social sciences, engages with ecological economics, or sufficiency-based frameworks, and challenges the technological solutionism that has characterized mainstream EdTech discourse for three decades. Papers from non-OECD contexts are strongly encouraged.

Submission Guidelines

Papers should be 6,000-9,000 words in length including references. We welcome theoretical, empirical, and policy-oriented contributions, as well as interdisciplinary work that does not fit neatly within a single academic tradition.

Authors wishing to discuss a proposal informally before submission are encouraged to send a brief abstract and note of intent to the guest editors at the address below. We are particularly interested in ensuring geographic and disciplinary diversity across the issue and actively encourage submissions from non-OECD contexts.

Key Dates and Submission Details

Abstract deadline (500 words): 31 January 2027

Full manuscript deadline: 30 June 2027

Expected publication: 21 December 2027

Word limit: 6,000-9,000 words (including references)

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Visions for Sustainability: <https://ojs.unito.it/index.php/visions>

We look forward to your contributions.

Theme 1: The Cognitive Wager

What are we betting human learning on?

The central promise of AI in education is that it enhances learning: personalized pathways, immediate feedback, intelligent scaffolding. But a growing empirical literature complicates this picture. Studies on cognitive offloading document a consistent pattern: AI assistance improves immediate performance while measurably reducing independent capacity over time. Students who complete tasks with AI help perform worse when the help is removed¹. Researchers have begun calling this the “paradox of AI assistance”²: better outputs, weaker thinking³. This theme asks the sustainability question about cognition: if human learning depends on productive struggle, on the discomfort of not yet knowing, on the gradual construction of mental models through effort and error, what happens when AI progressively absorbs that effort? Is there a *cognitive sustainability* problem at the scale of a generation? And how should educational systems respond?

Key Questions

- What does the longitudinal evidence show about the relationship between AI tool use and independent learning capacity? How should we interpret methodological limitations in the existing literature?
- Is there a meaningful distinction between AI that supports learning and AI that substitutes for it? How can this distinction be operationalized in educational design?
- What does *cognitive sustainability* mean as a concept, and what frameworks from ecological economics or commons theory can be adapted to think about it?
- How do metacognitive and self-regulatory dimensions of learning interact with AI assistance? What conditions preserve or undermine learner agency?
- Are there documented cases (e.g. in STEM education, language learning, or professional training) where hands-on, non-AI-mediated learning demonstrably outperforms AI-assisted equivalents on measures of durable understanding?

Theme 2: The Invisible Bill

What does AI in education actually cost, and who pays?

Training a large language model can consume over 1,000 MWh of electricity and generate hundreds of tonnes of CO₂⁴. A typical data centre supporting AI services may use millions of gallons of fresh water daily for cooling. Device manufacturing and e-waste add further planetary burdens. None of these costs appear in school procurement spreadsheets, EdTech impact assessments, or policy documents advocating AI adoption in classrooms. This is not merely a problem of incomplete accounting. It is a structural feature of how AI-powered EdTech is sold: the ecological costs are externalised onto the atmosphere, the water table, and communities near data centres, while the benefits are presented as universal and costless. Papers here would bring that framework into direct contact with the AI in education debate.

¹ Liu, G., Christian, B., Dumbalska, T., Bakker, M. A., and Dubey, R., “AI Assistance Reduces Persistence and Hurts Independent Performance”, arXiv e-prints, Art. no. arXiv:2604.04721, 2026. doi:10.48550/arXiv.2604.04721.

² <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2025.1550621/full>

³ Fan, Y., Tang, L., Le, H., Shen, K., Tan, S., Zhao, Y., Shen, Y., Li, X., & Gašević, D. (2025). Beware of metacognitive laziness: Effects of generative artificial intelligence on learning motivation, processes, and performance. *British Journal of Educational Technology*, 56, 489–530. <https://doi.org/10.1111/bjjet.13544>

⁴ Patterson, David, Joseph Gonzalez, Quoc Le, Chen Liang, Lluís-Miquel Munguia, Daniel Rothchild, David So, Maud Texier, and Jeff Dean. “Carbon emissions and large neural network training.” arXiv preprint arXiv:2104.10350 (2021).

Key Questions

- What are the material and energy costs of the AI infrastructure supporting educational technology, and how do they compare to the claimed benefits? What methodological frameworks (life-cycle assessment, material flow analysis) are most suitable?
- How do the ecological costs of AI-powered EdTech compare across deployment contexts (e.g. cloud-based platforms, on-device models, low-bandwidth alternatives)?
- What would a “sufficiency” or “right-to-repair” logic applied to AI in education look like in practice? What procurement and policy instruments could operationalise it?
- How do existing sustainability reporting frameworks -- for schools, universities, or national education systems -- account (or fail to account) for digital infrastructure costs?
- What does the “Slow Tech” tradition offer as a design philosophy for educational AI? How might it be applied to curriculum design, learning environment architecture, or institutional procurement?

Theme 3: Uneven Ground

Power, dependency, and who AI in education serves

AI in education does not arrive on neutral terrain. It arrives through platforms owned by a small number of Northern companies, trained on datasets that systematically underrepresent Southern languages, cultural contexts, and pedagogical traditions. Student data generated in schools from Nairobi to Bogotá flows into systems whose governance, legal accountability, and commercial logic are located elsewhere. Governance frameworks (e.g. ethical principles, safety guidelines, regulatory instruments) are imported wholesale from OECD contexts without adaptation. This theme asks who the current architecture of AI in education actually serves. It invites analysis of data colonialism in educational settings, the political economy of global EdTech platforms, the experience of teachers and learners in under-resourced and post-colonial contexts, and the structural conditions under which AI adoption deepens rather than reduces existing inequalities.

Key Questions

- What does “data colonialism” mean concretely in educational settings? How are student data extracted, processed, and monetised through global platform infrastructure, and what governance mechanisms exist or should exist?
- How do AI governance frameworks (ethical guidelines, regulatory instruments) developed in OECD contexts function when applied to education systems in the Global South? What is adapted, what is imposed, what is resisted?
- What are the infrastructure dependency risks for education systems that build on proprietary AI platforms? What alternatives (open-source, locally hosted, community-controlled) are being developed and at what cost?
- How does the concentration of EdTech platform ownership affect curriculum, pedagogy, and the diversity of educational approaches at a global scale?
- What do teachers and students in under-resourced contexts experience when AI tools are introduced into their classrooms? What gets displaced, what is enabled, and by whom are these trade-offs made?

Theme 4: The Deskillling of Teaching

Professional identity, labour, and the automation of pedagogy

What happens to teachers when AI mediates an increasing share of the pedagogical act? The concern is not merely economic -- though labour displacement is real -- but deeper: it is about the kind of expertise, judgment, and relational knowledge that teaching requires, and whether these capacities can be sustained in systems where AI handles assessment, feedback, differentiation, and lesson design. A growing phenomenological and sociological literature documents the emotional and professional costs: teachers whose 'professional learning' increasingly revolves around dashboard literacy and platform maintenance rather than reflection on learning⁵; teachers who feel their pedagogical authority is being delegated to algorithmic systems they do not understand and cannot interrogate⁶; institutions in which professional development has been redefined as technology training⁷. This theme asks whether, under these conditions, we can continue to reproduce the skilled, autonomous, relational teachers that sustainable education requires.

Key Questions

- What does “pedagogical deskillling” mean in the age of AI, and how does it differ from earlier rounds of educational technology adoption? What theoretical frameworks are most useful for analysing it?
- What do teachers report about changes to their professional identity, sense of autonomy, and relational role when AI tools are introduced into their schools?
- How does AI adoption in education interact with existing processes of teacher deprofessionalisation, managerialism, and accountability regimes?
- What are the conditions (institutional, regulatory, cultural) under which AI tools augment rather than displace teacher judgment and expertise?
- How do teacher unions, professional bodies, and education authorities in different national contexts respond to AI-driven changes to teaching roles? What governance models are emerging?

Theme 5: Other Ways

Slow learning, hands-on pedagogy, and sustainable educational alternatives

An issue that diagnoses must also *imagine*. This final theme asks what genuinely sustainable human learning looks like, not as a nostalgic retreat from technology, but as a rigorous alternative framework. It draws on the journal's own tradition, on the literature of contemplative pedagogy⁸, on documented cases of hands-on and community-rooted learning that produce durable understanding and authentic engagement⁹, and on the long tradition of “appropriate technology” in development contexts (Schumacher, Illich). This theme is also where empirical practitioner work is most welcome: evaluations of STEM laboratory programmes, school-based science activities, community learning centres,

⁵ <https://www.frontiersin.org/journals/education/articles/10.3389/educ.2026.1844085/full>

⁶ Röhl, T. (2025). Machine teaching? Teachers' professional agency in the age of algorithmic tools in education. *British Journal of Sociology of Education*, 1–15. <https://doi.org/10.1080/01425692.2025.2495625>

⁷ Williamson, B., Macgilchrist, F., & Potter, J. (2023). Re-examining AI, automation and datafication in education. *Learning, Media and Technology*, 48(1), 1–5. <https://doi.org/10.1080/17439884.2023.2167830>

⁸ Barbezat, D.P. & Bush, M. (2014). *Contemplative Practices in Higher Education: Powerful Methods to Transform Teaching and Learning*. Jossey-Bass / Wiley, San Francisco.

⁹ Villarroel V., Rabanal I., Santana J. et al (2025). Applying Kolb's experiential learning cycle for deep learning: A systematic literature review. *Social Sciences & Humanities Open* doi: 10.1016/j.ssaho.2025.102096

and other pedagogical environments that do not depend on AI infrastructure¹⁰. The question is not whether these approaches can scale in the way AI platforms claim to; it is whether they cultivate the capacities (e.g. curiosity, persistence, collaborative problem-solving, ecological awareness) that sustainable societies most need.

Key Questions

- What does documented hands-on, non-AI-mediated learning produce that AI-assisted equivalents do not? What kinds of evidence (longitudinal, qualitative, comparative) would be most persuasive?
- How can the “Slow Tech” framework be applied specifically to educational design? What would a “slow pedagogy” look like in practice?
- What do contemplative, mindfulness-based, or biofeedback-assisted approaches to learning offer in the context of AI saturation? Where is the evidence for their effects?
- How do community-based and place-based learning models in the Global South resist or negotiate the adoption of AI platforms? What are the conditions for their sustainability?
- What is the relationship between hands-on STEM education and the cultivation of ecological literacy? Can direct engagement with natural phenomena (e.g. in the laboratory, in the field, in school gardens) be understood as a form of sustainable learning?

¹⁰ <https://www.unesco.org/gem-report/en/publication/tecnologia-en-la-educacion-una-herramienta-nuestra-medida-2024>