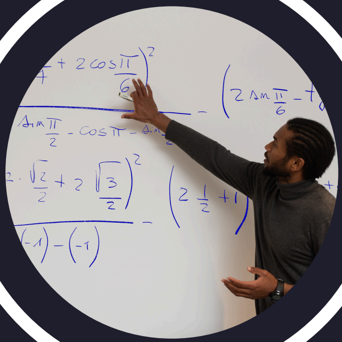
LEARNING BRIEF

How is AI Transforming Teachers' Roles in Low- and Middle-Income Countries?



AI Observatory

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About the AI Observatory

EdTech Hub's AI Observatory and Action Lab exists to help drive greater equity in learning outcomes in the age of AI. The AI Observatory scans global trends, uses a hypothesis-driven approach to test practical applications, leads innovative pilots, and distils practical insights to support decision-makers in low-and middle-income countries.

Our goal is to ensure AI is integrated effectively and equitably, improving education systems and learning outcomes for all. EdTech Hub's AI Observatory is made possible with the support of the UK's Foreign, Commonwealth and Development Office. https://edtechhub.org/ai-observatory/

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Abbreviations and acronyms

AI	Artificial Intelligence
DPL	Digital personalised learning
LMIC	Low- and middle-income country
RCT	Randomised controlled trial
TPD	Teacher professional development

Why this matters

Artificial Intelligence (AI) is increasingly being leveraged to support teachers in low- and middle-income countries (LMICs) to address teaching challenges. Teachers in LMICs often have to contend with overcrowded classrooms, poor teaching conditions, a lack of teacher materials and resources, and poor-quality training (↑Amiri, 2025; ↑Amoah-Oppong et al., 2025; ↑Eke, 2024; ↑Henkel et al., 2024; ↑Nyaaba, 2024). AI (including machine learning and predictive and generative AI) can potentially enhance teaching by automating routine tasks, supporting lesson planning and assessment, personalising learning, synthesising learning analytics, reshaping pedagogy and extending teachers' capacities (↑Bozkurt et al., 2024; ↑Ogoke et al., 2025). While AI could help overcome educational barriers in LMICs, concerns include limited teacher professional development (TPD) to use AI effectively, difficulties verifying whether students are actually learning, unreliable AI outputs, loss of professional skills and teacher agency, reduced metacognition, increased cognitive offloading and cognitive atrophy, and potential job displacement (↑Bozkurt et al., 2024; ↑Kosmyna et al., 2025).

At a systems level, teachers' use of AI is shaped by broader concerns, including limited digital infrastructure and device access, persistent digital divides, absent or unclear governance frameworks, ethical concerns, safeguarding risks, and the rapidly evolving AI landscape, which demands continual adaptation and lifelong learning. While these wider issues are critical, this brief will address them only where they directly intersect with teachers' roles, as each issue could warrant a standalone analysis.

In this learning brief series, we explore the extent to which AI is upgrading, disrupting, and transforming teachers' roles in LMICs. This topic focuses on the 'empowered teachers' North Star, one of the 'Six North Stars' identified by EdTech Hub's AI Observatory as key leverage points for change to narrow the learning divide in the age of AI (↑Luz et al., 2025). We draw on the Three Horizons Theoretical Framework of EdTech Hub's AI Observatory (↑Luz et al., 2025), using the descriptions of each 'horizon' to envision what upgrading, disrupting, and transforming mean in the context of AI's impact on teachers' roles (see Table 1 below). Having a systematic view of education and its long-term goals helps us spot the key leverage points for change, so we can shape what we learn, how we teach, and how education systems are run and designed to keep pace with AI's impact on learning and systems.

Table 1. EdTech Hub's Three Horizons Framework for empowering teachers

Three Horizons	What does this mean for empowering teachers?	Use cases
Horizon 1: Current dominant system, where change happens incrementally within existing structures.	**UPGRADE** Early integration of AI into teachers' roles, where some existing tasks and processes become streamlined or enhanced, while new demands emerge around oversight, adaptation, and judgement.	■ **AI for content creation and lesson planning** ■ **AI for administrative tasks** ■ **AI for assessments, grading, and feedback** ■ **AI for professional development and coaching**
Horizon 2: Turbulent space of innovation & experimentation as society shifts from the status quo to a new paradigm.	**DISRUPT** AI use is increasingly formally evaluated and embedded in teaching, addressing some early identified issues and disrupting aspects of teachers' roles in ways that shift their practice or time allocation.	■ **AI-enhanced digital personalised learning** ■ **AI tutor chatbots** ■ **AI teaching assistants** ■ **AI-powered inclusive education and language accessibility**
Horizon 3: Radical new visions of the future that exist on the fringes today compete to become the dominant system.	**TRANSFORM** The role of teachers is fundamentally changed, with AI being a core facet of the teaching and learning experience in novel ways.	■ **AI-led learning environments** ■ **Teacher–AI complementarity and hybrid intelligence** ■ **Multi-intelligence learning ecology**

This learning brief is the third in a series of three on the impact of AI on teachers' roles. It maps where AI use in LMICs is beginning to, or has the potential to, fundamentally change and 'transform' teachers' roles (Horizon 3). Companion briefs focus on the extent to which AI can 'upgrade' (Horizon 1) (↑Adam & Lester, 2025), and 'disrupt' (Horizon 2) teachers' roles (↑Adam & Lester, 2026). By presenting AI integration in education along these horizons, we hope to make system shifts feel more navigable for educators.

What we're learning

This section outlines the primary use case categories of AI for 'transforming' teachers' roles and their ability to teach in LMICs. The use cases chosen for the 'transform' horizon fundamentally shift teachers' practice and/or how they allocate their time. This horizon envisions a future where AI fundamentally transforms the educational landscape. Beyond identifying use cases that address pre-existing educational challenges, this horizon also addresses challenges arising from the integration of AI. In response to the turbulence AI has brought, this learning brief examines the broader picture of how AI is holistically integrated into education and how teachers' roles are evolving as AI in education becomes more established. As this section presents less-charted territory, varied trends and speculative futures are explored, rather than the stronger evidence focus presented in the first two learning briefs of the series (↑Adam & Lester, 2025; ↑Adam & Lester, 2026).

For each use case, we describe:

- The contextual challenges that teachers experience before the integration of AI, and since AI has been integrated into education.
- The value AI can provide in addressing the challenges teachers face and/or in providing them with additional support.
- Examples or evidence available to illustrate the current or potential value of the use cases.
- The complications, risks, or concerns that may arise from the uses of AI.

While examples from LMICs are prioritised, we also draw on examples from other countries, where relevant.

AI-led learning environments

Contextual challenge

Education systems face a structural misalignment between rising expectations and an industrial-age logic of batch-processing learning (↑Dockterman, 2018). With worldwide teacher shortages and standardised models—fixed curricula, age-based cohorts, synchronised pacing, and a single teacher responsible for instruction, assessment, and classroom management—systems often struggle to deliver both quality and individualised focus at scale. Even highly trained teachers must manage wide variability in learner readiness, motivation, and pace within a single classroom, leading to teaching to the ‘middle’. In LMICs, larger class sizes, limited resources, undertrained teachers, and system fragility further undermine consistency and continuity, making meaningful learning uneven and heavily dependent on individual teacher capacity.

Potential value of AI

Proponents of AI-led learning environments envision that, with the technology available today — AI-powered personalised learning, real-time learner analytics, responsive and adaptive content, and conversational AI tutorbots — AI learning environments can democratise access to high-quality, learner-differentiated learning, to enable more holistic and boundless educational experiences. In AI-led learning environments, AI is the instructional core. As AI advances, it may become the instructional agent. Models differ in the extent to which a teacher (or person in a similar role) is part of the model and the role of that person.

Examples

The following examples illustrate where AI-led learning environments are taking on the core instructional roles previously undertaken by teachers. In each case, the teacher’s role shifts differently, sometimes reducing to technology support, caregiving, and disciplining and sometimes expanding to cultivating students’ cognitive, social, and metacognitive development in ways that extend beyond direct instruction.

2 Hour Learning[1] is a model used at Alpha AI-powered private schools[2] in the United States that condenses core academic learning into a two-hour morning block using adaptive, AI-driven tutoring technology (↑2 Hour Learning, 2025). The platform uses proprietary apps built by Trilogy Software and other platforms, such as Khan Academy and IXL. These support individualised pacing and progression-by-mastery. After 2 hours, students engage in life skills, passion projects, or personal interests facilitated by ‘guides’, rather than traditional learning approaches. The role of the guide is to support the student’s socio-emotional needs, motivate them, and coach them to become self-driven learners. According to Alpha, this approach enables students to learn 2.6 times faster in just 2 hours a day (↑Alpha School, n.d.), although these claims lack independent validation. While efficient, the model is expensive. The starting salary for a guide is around USD 100k (higher than the average teacher salary in the

[1] See https://2hourlearning.com/. Retrieved 14 April 2026.

[2] See https://alpha.school/. Retrieved 14 April 2026.

United States) (↑Crossover, 2025). With group sizes of around six students (↑Crossover, 2025), annual school fees at Alpha are estimated at USD 40,000 (↑Sitrin, 2025), compared to the national average of USD 12,790 for private schools in the United States (↑Hanson, 2024). Attempts to expand the model to cyber charter schools (i.e., publicly funded schools) have thus far been unsuccessful (↑Karbal, 2025).

Squirrel AI[3] is a Chinese company using AI to provide a personalised, advanced tutoring experience at scale. While available on tablets for self-directed learning at home, Squirrel AI operates over 3,000 franchised learning centres across China and internationally (↑World Economic Forum, n.d.). With over 24 million students who have used the platform (↑World Economic Forum, n.d.), it leverages large-scale learner data and adaptive models through its 'Large Adaptive Model' (↑Squirrel Ai Learning, 2026). Squirrel AI uses an innovative system that leverages Large Language Models to diagnose and correct students' errors with 78.3% accuracy, effectively automating a core pedagogical function traditionally performed by teachers. Along with the Intelligent Adaptive Learning System that breaks down knowledge into tens of thousands of smaller knowledge points, the platform incorporates 2–3-minute videos from award-winning educators (↑Squirrel Ai Learning, 2026). At the centres, in-person teaching assistants provide on-demand hands-on support. As part of the model, the 'Mode of Thinking Capacity Methodology' aims to support learners in developing their critical thinking, creative, socio-emotional, and real-world problem-solving skills (↑Squirrel Ai Learning, 2026). It also aims to support with memory, reasoning, learning effective study techniques and application strategies. Parents have access to detailed learning analytics. Squirrel Ai uses a membership-style revenue model at a mid-range tutoring price bracket that varies by franchise. Concerns with Squirrel AI include reducing learning to discrete, testable fragments; using a narrow pedagogical approach that limits learning through open-ended inquiry and discussion-based learning; reducing the teacher's role to a reactive one; and intense data surveillance of a child's development (↑Beard, 2020).

ConveGenius[4] embeds its AI platform within public systems in India via Personalised Adaptive Learning (PAL) programmes and AI-enabled conversational tools (↑ConveGenius.ai, n.d.). ConveGenius has been implemented at scale, reaching over 150 million K–12 learners across 1.5

[3] See https://squirrelai.com/, Retrieved 14 April 2026.

[4] See https://convegenius.com/, Retrieved 20 April 2026.

million government schools through school-based deployments and its multilingual AI chatbot, SwiftChat (↑AWS India, 2023; ↑ConveGenius.ai, n.d.). For a portion of the day, learners independently engage with AI-driven maths and literacy content at their own pace in shared classroom or lab settings where learners progress (↑ConveGenius.ai, n.d.). The platform diagnoses learning levels, adapts instruction, and provides real-time feedback (↑AWS India, 2023; ↑ConveGenius.ai, n.d.). Teachers, where present, are positioned to use system-generated insights on student performance and learning gaps, while the platform manages instructional delivery, assessment, progression, and remediation. The model is typically funded through government programmes, such as in Andhra Pradesh, where its implementation cost the state government 1.8% to 2.3% of its annual per-student education budget to deliver (↑ConveGenius.ai, 2025). The 'disrupt' learning brief delves deeper into the evidence for ConveGenius, where learning gains are reported as approximately 2.3 times higher than in traditional settings (↑Adam & Lester, 2026; ↑Eble et al., 2025).

AI-led learning environments: AI use case summary

The examples above highlight different models of AI-led learning environments: a high-cost private school model in the United States, a mid-cost franchised tutoring model in China, and a low-cost government partnership model in India. While AI provides the instructional core in all cases (content, sequencing, error diagnostics, feedback, assessment logic, coaching, and so on), the presence and role of the teacher differ somewhat in each. With ConveGenius, the teacher, when present, supervises, monitors learning progress in dashboards, and provides technical support. With Squirrel AI, in addition to the above-mentioned roles, teaching assistants may provide on-demand support when AI diagnosis is insufficient and support with motivation. While socio-emotional development is noted, it is a platform task, not a teacher task. In Alpha schools, the guides offer more comprehensive support, including motivation, socio-emotional support, and the development of curiosity, creativity, and critical thinking. To leverage the best of both AI and teacher (see the section on Teacher–AI complementarity below), the teachers' role ideally goes beyond providing knowledge and facilitating learning processes towards a predefined goal, to cultivating the conditions for optimal learning and growth (↑Rajasekaran et al., 2024). Here, the teacher's role may shift towards supporting the learner to ask better questions, tolerate ambiguity, sharpen critical discernment, strengthen ethical awareness and model both scepticism and curiosity in learning, while also serving as disciplinarian and caregiver for emotional support.

Risks and concerns regarding AI use

While personalised learning models are often presented as a cost-effective solution for providing large-scale personalised learning to students, the human support required to make it a high-quality, holistic learning experience is costly and unlikely to be scalable without reduced quality. Applying such models in public education systems in ways that would not compromise holistic learning would be difficult where teacher quality, overcrowded classrooms, and scarce resources limit the feasibility of sustained mentorship models at scale (↑Teacher Task Force, 2025). As in the examples above, models that incorporate cultivator-level teachers remain available to the privileged few. A potential danger of AI-led learning environments in public schools is that the (costly) human-led elements may be neglected, leaving only AI-led learning for the masses. ↑Trucano (2023) calls this the 'third digital divide', in which the poor have access only to technology, and the wealthy can access both technology and human support.

Furthermore, caution is needed to not reduce the teacher's role to only the relational aspects (e.g., mentorship, facilitation, teaching assistant, caregiving, and personal knowledge of their students). Content, pedagogy, and relational aspects of teaching are often deeply intertwined. Teachers tie together deep expertise in higher-order pedagogy, subject knowledge, assessment, contextual judgment and relational aspects in ways that AI cannot replicate. Noting the high salaries and the prerequisite skills required for a guide role at Alpha schools, much professional development would need to be given to teachers (at scale) to shift their role to cultivators (↑Teacher Task Force, 2025). Conversely, reducing their role to tech support or behaviour management risks de-skilling the profession, undermining equity, and weakening the civic and ethical responsibilities teachers hold in shaping education. Rather than narrowing their function, AI should strengthen and extend teachers' professional capacities (↑Teacher Task Force, 2025).

Lastly, while diverse pedagogical approaches are used throughout the day in traditional classrooms, hyper-personalised learning environments often restrict academic activities to individualised, computer-based work, without opportunities for peer dialogue or social constructivist learning (↑Khor & Mutthulakshmi, 2023). This creates a false divide between solitary, screen-based academics and in-person social 'life skills' activities. A more effective model would integrate technological and non-technological methods for both individual and social learning to simultaneously enrich both knowledge and passions.

Teacher–AI complementarity and hybrid intelligence

Contextual challenge

With increased integration of AI in education, a resulting challenge across all contexts is its use as a tool designed to automate or replace core teaching and learning functions (↑Cukurova, 2025; ↑Holstein & Aleven, 2022). This use poses a significant risk of human cognitive atrophy (the decline or weakening of people's mental abilities, such as memory, problem-solving, critical thinking, or creativity), as overreliance on AI could lead to the long-term forfeiture of fundamental reflective competencies crucial for both teacher and learner competence development (↑Cukurova, 2025). Furthermore, if educational systems exclusively adopt fully automated AI-led systems—such as through AI-powered personalised learning and AI tutors—they risk dehumanising learning by replacing human interactions, which are vital for developing social and emotional components of intelligence, tacit knowledge, and wisdom gained through rich real-world experiences (↑Cukurova, 2025).

Potential value of AI

The concepts of 'teacher–AI collaboration' and 'hybrid intelligence' aim to circumvent the aforementioned dangers by ensuring humans remain engaged in critical thinking and decision-making processes, thereby augmenting rather than replacing teachers' intellectual abilities (↑Cukurova, 2025). Hybrid intelligence in education refers to a tightly coupled, co-evolving teacher–AI system in which AI and teacher cognition interact through ongoing reciprocal processes to extend both AI and teacher learning and simultaneously generate new understanding about learning itself (↑Cukurova, 2025). This synergistic superstructure would leverage AI's data processing and analytics capabilities alongside distinct human strengths such as cognitive flexibility, reflective long-term planning, and real-world contextual understanding (↑Cukurova, 2025; ↑Cukurova, 2026). Ideally, the result will be an emergent intelligence that is more than the sum of its parts. This shift would profoundly change the role of the teacher and necessitate broader innovation in educational systems (↑Cukurova, 2025).

Examples

There are no 'complete' examples of hybrid intelligence. True hybrid intelligence would require AI and humans to be a synergistic superstructure where they interact fluidly, shaping intents and meanings dynamically (↑Cukurova, 2025). The following examples illustrate teacher–AI complementarity.

Eidu[5] and EdTech Hub experimented with teacher–AI collaboration in a digital personalised learning (DPL) tool in Kenya (↑EdTech Hub, no date). Through A/B testing, ↑Sun et al. (2024) investigated how teacher agency in DPL can affect behavioural changes and learning outcomes in Kenya. Teachers in the experimental group could apply their pedagogical judgement to override the system's suggested content for learners to practise, whereas teachers in the control group were limited to the system's suggested content. The authors found that in the experimental group, where teachers could override AI content recommendations, learners achieved significantly higher digital scores than those in the control group. Learner device usage increased with the degree of teacher agency, but neither did lesson plan usage nor learners' digital scores. These results underscore that maximising benefit from AI in classrooms requires interfaces and designs that enhance teacher–AI synergy rather than ceding all decisions to algorithms.

Tutor CoPilot uses a human-AI approach to provide real-time pedagogical suggestions to human tutors during live, open-ended, chat-based tutoring sessions (↑Wang et al., 2025). Unlike direct-to-learner educational chatbots like Khanmigo, the tutor works in tandem with AI to support the learner. Tutors retain full control over whether and how they use the AI-generated suggestions, allowing them to draw on their contextual knowledge and professional judgment. Tutor CoPilot aims to improve the quality and effectiveness of tutors' responses in the moment, while also supporting their ongoing professional learning. A randomised controlled trial (RCT) was conducted in federally funded schools in the United States serving

[5] See https://www.eidu.com/. Retrieved 18 April 2026.

low-income communities through a maths tutoring programme (↑Wang et al., 2025). The study involved 900 tutors and 1,800 K–12 students. Findings suggest modest but meaningful gains: students whose tutors had access to CoPilot were 4 percentage points more likely to master session lesson topics. For lower-rated, less-experienced tutors, their students improved by up to 9 percentage points, indicating that the system can help narrow gaps in instructional quality. Tutors using Tutor CoPilot were also more likely to employ high-quality strategies that foster deeper student understanding, suggesting that the tool shapes not just outcomes but instructional practices. Tutors reported that sometimes feedback was too "smart", requiring them to adapt it. This adaptation illustrates their agency and critical discernment. They also recommended that grade-level appropriate language be generated. The estimated annual cost of approximately USD 20 per tutor provides a scalable, cost-effective method to improve tutor quality.

In Morocco, a study was conducted to investigate 56 English as a Foreign Language (EFL) teachers' perceptions and practices of teacher–AI collaboration for reflective practice and the impact it may have on their instructional practices (↑Outamgharte et al., 2025). Teacher–AI reflective co-practice is a form of teacher-facing collaboration in which AI tools are integrated into educators' reflective processes to support ongoing professional learning and instructional improvement. Teachers engaged with generative AI as both a primary and supplementary reflective partner, using it to analyse lessons, generate feedback, and identify areas for pedagogical refinement. The study found that teacher–AI collaboration can enhance reflective depth, increase confidence, and support the development of more effective instructional strategies. Teachers reported that AI helped surface blind spots, structure reflection, and prompt consideration of alternative pedagogical approaches. However, effectiveness was highly contingent on teacher expertise and the context of use. Participants emphasised the irreplaceable role of human interaction in reflection and noted the need to balance AI-supported reflection with established reflective practices. The findings also point to the risk of overreliance on AI and highlight the importance of maintaining critical engagement with AI outputs. Overall, this case illustrates how teacher–AI complementarity can extend beyond instructional delivery into professional learning, offering a scalable and low-cost mechanism to support reflective practice while reinforcing, rather than displacing, teacher agency.

Teacher–AI complementarity and hybrid intelligence: AI use case summary

The term 'teacher–AI collaboration' is used very loosely in literature, from describing a teacher tailoring AI-developed lesson plans (↑Dennison et al., 2026; ↑Park & Park, 2024), to characterising live integration with AI during teaching/tutoring (↑Sawaya et al., 2025; ↑Wang et al., 2025; ↑Yang et al., 2023), or supporting teachers with reflective practice (↑Outamgharte et al., 2025). A study in China found six types of teacher–AI collaboration: One Teach, One Observe; One Teach, One Assist; Co-teaching in Stations; Parallel Teaching in Online and Offline Classes; Differentiated Teaching; and Team Teaching (↑Kim, 2024). ↑Cukurova (2026) similarly proposes a five-level teacher–AI teaming framework comprising transactional, situational, operational, praxical, and synergistic modes of interaction. The deepest synergistic mode requires two-way internalisation, where both the teacher and the AI's practices learn and enrich each other as they co-evolve(↑Cukurova, 2026).

However, as ↑Cukurova (2026) highlights, a meta-analysis of 106 experimental studies illustrates that human-AI teams underperform 58% of the time, performing worse than the best of either alone in the majority of cases (↑Vaccaro et al., 2024). This raises questions about what conditions need to be in place for such teacher–AI collaborations to work. Effective teacher–AI collaborations would likely require high levels of teacher agency and developing human competencies required for successful interaction, such as human agency, metacognition, ethical considerations, complex higher-order and long-term thinking skills related to human-centred design, and conscious decision-making on when not to use AI (↑Cukurova, 2025; ↑Teacher Task Force, 2025). AI systems that respect teacher autonomy and foster complementary teacher–AI interactions allow for more trust and wider adoption by teachers, students, and parents than prescriptive models, underscoring the need to design technologies that protect professional agency while ensuring effectiveness, ethics, and sustainability in education (↑Teacher Task Force, 2025).

Teacher–AI collaboration presents both meaningful affordances and persistent challenges. It can enhance instructional design and delivery, support professional development, reduce grading workload, improve teaching engagement through increased technological self-efficacy, enable personalised learning, and improve reflective practice to help teachers refine instructional strategies and identify professional growth needs (↑Ding et al., 2025; ↑Kim, 2024; ↑Outamgharte et al., 2025; ↑Rokkones & Giannakos, 2025). However, key barriers include unclear curriculum and ethical guidance, limited evidence of effectiveness, data governance concerns, reliance on commercial tools, and the need to preserve teacher agency and human interaction (↑Kim, 2024; ↑Rokkones & Giannakos, 2025).

Risks and concerns regarding AI use

As ↑Cukurova et al. (2023) note, there is a lack of research on and implementation of human–AI hybrid intelligence systems, although more recently there has been an increase in research on teacher–AI collaboration. Hybrid intelligence only works effectively when teachers choose to exercise their agency rather than cede their tasks to AI. A long-term concern is that the critical judgement of AI outputs is initially pursued but, over time, this practice is followed less often, with the teacher deferring to the AI tool's judgement more often, constituting 'automation bias' (↑Buçinca et al., 2021). Moreover, new teachers may not have the pre-AI experience to effectively critique AI decisions and collaborate with it. For the vision of hybrid intelligence to be achieved, TPD (both foundational TPD and TPD that builds AI literacy) is of utmost importance, yet this is a present-day challenge, even for basic professional development needs.

While teacher–AI hybrid intelligence safeguards against human atrophy, there is still a need to preserve AI-free zones within educational environments—spaces where students and teachers engage in thinking, problem-solving, and collaboration without algorithmic mediation. Much like digital detoxes or time immersed in nature, which are shown to enhance well-being, focus, and clarity, AI-free learning spaces can help individuals reconnect with what it means to be a human, critical, and creative thinker. For example, inquiry-based group projects or community-led discussions cultivate dialogue and collective meaning-making that no AI can authentically replicate. Similarly, creative writing workshops, art studios, and outdoor explorations allow students to struggle productively, experiment, and refine ideas in ways that build resilience and connectedness with humans and the environment. In teacher practice, professional learning circles can serve as vital non-digital spaces for reflection, debate, and pedagogical growth. Together, these AI-free practices ensure that education nurtures human imagination, ethical reasoning, and relational capacities—dimensions that risk erosion if every aspect of thinking and learning becomes hybridised.

Multi-intelligence learning ecology

Contextual challenge

Across education systems, from high- to low-income contexts, there is a misalignment between holistic learning needs (as envisioned by ↑UNESCO (2016) in the Incheon Declaration), and the narrow educational opportunities offered through formal schooling (↑Miseliunaite et al., 2022). Cognitive outcomes remain prioritised, with social, emotional, cultural, and ethical dimensions often considered secondary or optional. The rapid expansion of AI in education has intensified this tension, with AI solutions tending to focus on measurable cognitive learning outcomes, i.e., 'learnification' (↑Biesta, 2016; ↑Knox et al., 2020). This raises concerns about diminished human connection as reliance on digital systems increases (↑Adam, 2025). In many contexts, from those supporting AI integration to those rejecting it, responses to AI have been largely reactive rather than intentional, highlighting the need for more purposeful, coherent, and intentional AI integration approaches that can balance technological and human dimensions (↑Cilliers et al., 2026). In a recent interview, Sal Khan, an ambassador for the AI in education revolution, stated: "AI is going to help [...]. But I think our biggest lever is really investing in the human systems" (↑Barnum, 2026).

Potential value of AI

A multi-intelligence learning ecology aims to address the need for holistic learning in the age of AI through safeguarding human connection. It is conceptualised here as an emergent learning system that intentionally brings together diverse intelligent actors (human and artificial) across different instructional agency configurations, including AI-led, human–AI collaboration, and human-only learning. Such an ecology would integrate varied pedagogical approaches alongside multimodal and multidisciplinary learning to engage multiple forms of intelligence[6]—cognitive, emotional, social, creative, cultural, computational, collective and existential-spiritual—to support holistic educational experiences and outcomes. A multi-intelligence learning ecology differs from hybrid intelligence, which specifically focuses on optimising human–AI synergies to extend cognition. Instead, a multi-intelligence learning ecology emphasises finding the right combination through the plurality of pathways offered. This would allow for different forms of intelligence to be activated, combined, and reconfigured. AI-led, human–AI, and human-only configurations would thus be mobilised at different points in ways that are purposeful and contextually responsive. In doing so, this conceptualisation offers a means to move beyond the constraints of standardised mass education towards forms of learning that cultivate knowledge, skills, values, and dispositions necessary for holistic development, meaningful social participation, and human flourishing, including care for others and stewardship of the environment (↑Adam, 2025). Figure 1 below expands on the various components of a proposed multi-intelligence learning ecology. By virtue of being an ecology, these are not seen as fixed, and indeed, components and subcomponents can be added and adapted.

[6] This draws inspiration from ↑Gardner's (1999) conceptualisation of multiple intelligences, although it does not map to them.

Figure 1. *Multi-intelligence learning ecology components*

Intelligent actors The human and artificial agents that generate, interpret, and act on knowledge within the learning ecology.	▪ **Human actors:** Students, teachers, peers, families, communities, and indigenous or cultural knowledge holders ▪ **Artificial actors:** AI systems, including machine learning models, generative AI, adaptive learning systems, and AI agents
Instructional agency configurations The distribution of instructional control and decision-making across human and artificial actors in the learning process.	▪ **AI-only** ▪ **AI-led, human-supported** ▪ **Human-led, AI-supported** ▪ **Hybrid/human–AI shared agency** ▪ **Human only (individual or collective)**
Pedagogical approaches The underlying theories and philosophies that shape how learning is structured, facilitated, and experienced.	▪ **Instructivist approaches** ▪ **Cognitive constructivist approaches** ▪ **Social constructivist approaches** ▪ **Dialogic/Socratic approaches** ▪ **Connectivist approaches** ▪ **Critical and liberationist approaches** ▪ **Culturally responsive approaches**
Learning modalities and environments The modes, formats, and environments through which learning content is represented, experienced, and engaged.	▪ **Representational modalities:** Text, audio, visual, etc. ▪ **Experiential modalities:** Physical, simulated, immersive (e.g., game-based, VR/AR) ▪ **Delivery environments:** In-person, online, blended, flipped ▪ **Participation structures:** Individual, group-based, networked/distributed
Knowledge integration The ways in which diverse forms of knowledge—disciplinary and non-disciplinary—are combined to deepen understanding and address complex, contextually grounded problems.	▪ **Multidisciplinary** ▪ **Interdisciplinary** ▪ **Transdisciplinary** ▪ **Cross-disciplinary** ▪ **Indigenous and cultural knowledge** ▪ **Experiential knowledge** ▪ **Community-based knowledge** ▪ **Embodied knowledge** ▪ **Tacit knowledge** ▪ **Practice-based knowledge**
Forms of intelligence The diverse human and computational capacities that are activated, developed, and valued within the learning process.	▪ **Cognitive** Reasoning, memory, problem-solving ▪ **Emotional** Empathy, affective awareness ▪ **Social** Interaction, negotiation, collaboration ▪ **Creative** Design, innovation, imagination ▪ **Cultural** Contextual meaning-making, identity ▪ **Ethical** Judgement, values, responsibility, ecological awareness ▪ **Computational** Data, logic, algorithmic reasoning ▪ **Collective** Distributed knowledge systems ▪ **Existential-spiritual** Meaning-making, purpose beyond the self

Examples

The examples below show segments that represent key aspects of the multi-intelligence learning ecology but do not provide an overarching view. It is worth noting, however, that the learning ecology presented above often reflects what educators and education systems strive to achieve, though they may not explicitly articulate it or approach it with intentionality.

Sweden's education system is rebalancing toward analogue-first foundational learning, after decades of striving towards an all-digital approach (↑Ministry of Education and Research, 2024; ↑Reichmuth, 2026; ↑Savage, 2026). Key policy changes include the re-introduction of physical textbooks, reduced screen use in early education, non-digital testing formats, and restricted use of devices in the classroom (focusing on more intentional and pedagogically justified use, as opposed to routine or ubiquitous use). Sweden's rebalancing was driven by a convergence of evidence and concerns, including declining reading and literacy outcomes in PISA[7] ranking; research suggesting that young children learn foundational skills (especially reading, writing, and comprehension) more effectively through printed texts and handwriting than screens (e.g., ↑Liao et al., 2024); teacher and expert reports of distraction from devices and superficial learning with heavy device use; stress, disengagement, and digital fatigue of learners; and growing policy concerns that the rapid digitalisation of schooling was implemented ahead of sufficient evidence on long-term cognitive and educational impacts (↑Huang et al., 2024; ↑Reichmuth, 2026; ↑Savage, 2026). This Swedish example aligns with the concept of a multi-intelligence learning ecology by prioritising human connection, intentionally selecting when and how digital technologies/AI should be used in age-appropriate and evidence-based ways, and taking a pedagogy-first (over an all-digital) approach.

Cold Spring School in California, United States, took an intentional approach to integrating AI into K–6 classrooms. The journey started with teachers experimenting with AI themselves and then building learners' critical skills to use AI responsibly (↑Weiss, 2025). The school developed a 'Human → AI → Human' framework where AI use is intentionally bounded, and used only where it adds pedagogical value at an appropriate point in the learning experience. This approach positions students to originate their

[7] The OECD's Programme for International Student Assessment. See https://www.oecd.org/en/about/programmes/pisa.html for more information. Retrieved 24 April 2026.

own ideas, use AI as a supportive aid, and then re-engage their critical thinking to refine and personalise the resulting output. An application of this approach was the ‘Living Legends’ research project, where students used Khanmigo to chat with AI-generated personas of historical figures. Students learnt to question as well as to prompt the AI tool appropriately to tailor its responses, applying critical thinking skills. Results show improvements in English Language Arts (ELA), improved writing outcomes, reduced teacher planning time, and increased staff collaboration (↑Weiss, 2025). With its purposeful use of AI and human collaboration, its intent to preserve critical thinking and creativity, its safeguarding of teacher and student agency, and its developmentally appropriate use of AI for learning, this example resonates with the concept of a multi-intelligence learning ecology. While this example is representative of the approaches many schools take to develop an AI strategy, it also serves as an exemplar for schools, districts, and education systems that are struggling to find the right approach.

At the University of Cape Town in South Africa, an outcome-first framework has been developed for educators to undertake purposive assessment redesign in an age of AI (↑Cilliers et al., 2026). The framework prompts educators to work backwards from current intended learning outcomes to determine whether they remain relevant, rather than redesigning assessment protocols reactively in light of AI advancements. ↑Cilliers et al. (2026) argue that the focus of redesigning assessments in light of AI advancements can be piecemeal, reactive and involve a never-ending cycle as AI evolves. Furthermore, AI tools can distort assessment design and educational intent. Instead of focusing on how to protect assessment from AI, the more essential question, according to↑Cilliers et al. (2026, p. 2), is whether the “intended learning outcomes [are] still relevant in a world shaped by AI”. To determine this, they urge staff to start by re-evaluating whether current intended learning outcomes are fully human-centric, AI-augmented, AI-enabled, AI-dominant, or obsolete (i.e., AI has fully replaced the need for this outcome to be learnt). Using ↑Cilliers et al.’s (2026) 12 dimensions of difference for reviewing learning outcomes, educators may leave some outcomes unchanged, modify others, introduce some earlier in the programme or drop some, and add new ones. This purposive approach aligns strongly with the conceptualisation of multi-intelligence learning ecology outlined above, honing in on outcomes and assessments, with outcome categories following a similar spectrum of instructional agency configurations.

Multi-intelligence learning ecology: AI use case summary

The above examples signal a shift towards more intentional integration of AI, along with a desire to carve out spaces for AI-free learning and human connection. Tying this intentionality back to the broader ecology opens up more dynamic educational possibilities and pathways than the structured use cases presented thus far in this learning brief series. For example, AI-led use cases can go beyond rigid personalised learning apps to AI-led pedagogical approaches that embed instructivist, cognitivist, constructivist, and Socratic learning methods, as well as active multimodal, immersive learning experiences (e.g., virtual laboratories and augmented reality simulations [↑Teacher Task Force, 2025]). Similarly, teacher–AI collaboration can support the teacher in preparing and conducting social constructivist activities such as role plays, debating, storytelling, socio-emotional learning activities, project-based learning, primary research, flipped classroom approaches, and cultural exchanges. This teacher–AI collaboration could also include connectivist approaches[8] and rhizomatic learning.[9] These varied approaches counterbalance the centrality bubble (i.e., learning mediated through one main source) that personalised learning approaches tend to embed.

Lastly, Teacher/human-only approaches include role modelling and embodying the curriculum (i.e., living out its principles, values, and practices through actions, relationships, and ways of being [↑Adam, 2020]), and mentoring and life coaching; inculcating patience, and perseverance; inspiring, motivating and encouraging participation; demonstrating ethical judgement, disciplining and providing authority when needed; fostering empathy and social skills; and providing genuine care, compassion, and emotion. The plurality of pathways within multi-intelligence learning ecologies will make it more possible to achieve a more human-centred future in education, while continuing to instrumentalise AI.

[8] Connectivist approaches encourage learning through distributed social networks and producing digital artefacts such as blogs and vlogs.

[9] Rhizomatic learning is a decentralised, non-linear approach to learning that rejects fixed goals and hierarchical structures, instead embracing exploration, emergent connections, and self-organisation.

Risks and concerns using AI

The main critiques of a multi-intelligence learning ecology echo those already discussed in previous sections of this brief. Firstly, empowering teachers to leverage and integrate the different subcomponents in unique ways requires intensive, continuous TPD where teachers grapple with more complex pedagogical possibilities. Within LMIC contexts, basic TPD is still difficult to implement (cost)-effectively, let alone the need for TPD specifically related to leveraging AI. Secondly, basic digital needs and infrastructure may not be in place to leverage the potential of AI, requiring more thoughtful adaptations. Thirdly, fully embracing the learning ecology can lead to decision-making fatigue and exhaustion in keeping up with fast-changing AI offerings, the need to become comfortable with continual change and uncertainty, and the potential for burnout. While more experienced teachers may thrive in the endless possibilities, novice teachers may feel overwhelmed (↑Piper & Dubeck, 2024).

Lastly, the proposed formulation of a multi-intelligence learning ecology simply makes explicit what many educators grappling with AI are already striving to achieve and may appear as self-evident. However, formulating it gives educators the language to describe their approach and make it an intentional process, rather than a haphazard, reactive, or defensive approach, as argued by ↑Cilliers et al. (2026).

Navigating what's ahead

With AI transforming the roles of teachers and the purpose of learning itself, it is essential to examine the ways in which teachers' roles are shifting and how teachers can be supported in these transitions. The following recommendations offer ways forward for effectively integrating AI into education so as to expand holistic educational opportunities and extend teachers' capabilities.

1. Conduct further research on how AI is transforming teachers' roles

AI-led learning environments

- **Investigate how the displacement of teachers from the instructional core affects learner motivation, identity, and relational engagement,** noting that content, pedagogy, and relational aspects of teaching are often deeply intertwined.

- **Investigate the system-level consequences of increasing platform dependence in public education,** such as outsourcing the governance of the instructional core — including pedagogical approaches — to EdTech providers, vendor lock-in and dependence, concentrated benefits for certain learner groups, surveillance of learning, and control and ownership of learner data.

Teacher–AI complementarity and hybrid intelligence

- **Investigate whether the long-term impacts of hybrid intelligence** between teachers and AI actually extend human capabilities as the teacher–AI duo co-evolve, or whether automation bias increases over time and critical discernment decreases.

- **Conceptualise how hybrid intelligence reshapes accountability** when decision-making is distributed across teachers and AI (including the platform developers). With varying degrees of teacher–AI collaboration, consider who takes ultimate responsibility for adhering to ethical guidelines, improving students' performance, and safeguarding them.

Multi-intelligence learning ecology

- **Explore how a multi-intelligence learning ecology can be scaffolded to support teachers** with varying experience levels, appetites for experimentation, and comfort with uncertainty and change, to ensure that a diverse range of teachers is supported.

- **Examine what new inequities may emerge within multi-intelligence systems**, including how differential access to AI tools, uneven data quality, and varying capacities among teachers, students, and communities may create new forms of advantage and disadvantage, potentially reinforcing or reconfiguring existing inequalities.

2. Monitor the impact of agentic AI in education

Agentic AI refers to artificial intelligence systems that can independently plan, reason, adapt, and act to achieve user-defined or self-motivated goals (↑Acharya et al., 2025). Agentic AI goes beyond being a tool or software that requires user input and prompting. In learning spaces, agentic AI can serve as 'intelligent tutors' delivering personalised instruction, 'assessors' providing autonomous feedback, 'learning companions' for collaborative problem-solving, or 'teaching assistants' to reduce administrative workloads (↑Kostopoulos et al., 2025). Agentic AI in educational spaces can operate autonomously, making proactive decisions and goal-oriented plans, and using long-term memory. It can independently initiate explanations, set pedagogical sub-goals, and dynamically adapt to a student's evolving needs across continuous, multi-step learning sessions, while also creating socially rich learning experiences. The primary challenges of agentic AI in education include pedagogical risks like excessive scaffolding and misaligned feedback, which foster learner dependency. Opaque systems can erode user trust, while training data can amplify harmful cultural biases.

Additionally, data privacy and safeguarding threats, cognitive overload, and prohibitive infrastructure costs can restrict equitable access for marginalised students (↑Kostopoulos et al., 2025). Concerns such as emotional manipulation by AI can increase in agentic forms (↑De Freitas et al., 2025). Monitoring agentic AI in education requires examining not only performance outcomes but also how decision-making authority, accountability, and control are redistributed between humans and agentic systems. It involves tracking reliability, potential error propagation, bias, traceability, teacher and student agency, data governance, and long-term system effects to ensure these technologies enhance, rather than undermine, equitable and meaningful learning experiences.

3. Reaffirm the irreplaceable role of teachers in education

AI integration in education must explicitly reaffirm the centrality of teachers as irreplaceable facilitators of learning and human development. AI cannot replicate the intertwined relationship between content, pedagogy, and human connection. Teachers' professional expertise, creativity, empathy, and ethical judgement remain indispensable for fostering holistic development, including socio-emotional growth, ethical reasoning, and interpersonal skills (↑Teacher Task Force, 2025). Overreliance on AI risks prioritising the transmission of theoretical knowledge over practical, transformative, meaningful educational experiences, and may contribute to the de-professionalisation of teachers or constrain the development of future educators' professional judgement. Teachers must retain decision-making authority, particularly in areas requiring moral discernment, relational responsiveness, and context-sensitive judgement (↑Teacher Task Force, 2025). By situating educators at the centre, AI can enhance personalised support, guide learning experiences, and facilitate higher-order pedagogical practices without compromising the relational and experiential aspects of teaching.

Practical strategies include preserving AI-free spaces for experiential learning, reinforcing mentorship and role-modelling, and explicitly designing AI tools to support rather than remove opportunities for human interaction. This approach safeguards the cultivation of empathy, resilience, social understanding, and emotional intelligence, which are essential for learners' development as responsible, ethically aware members of society. Ultimately, AI should function as an enabler of teacher agency, complementing human judgement and relational expertise. Maintaining the irreplaceable role of teachers ensures education remains a deeply human enterprise, where learners gain not only cognitive skills but also the relational, ethical, and experiential competencies required to thrive in diverse, real-world contexts.

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