iRAISE
International Research-driven Alliance for AI Serving Every child

Human-centred AI Literacy in Schools:

Evidence-based Multi-Stakeholder Recommendations for Primary & Secondary (K-12) Education

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iRAISE is an international multi-stakeholder coalition launched in February 2025 at the AI Action Summit and co-led by **everyone.AI** and the **Paris Peace Forum**.
The alliance brings together 12 **Governments**, **Major company leaders** (OpenAI, Google, Microsoft, Anthropic, Hugging Face), more than 50 **NGOs including Youth Voices** (for example, Children & Screens), and **Researchers** from leading universities (including Harvard, Stanford, Berkeley, and CNRS), with the support of **international organizations** such as UNESCO, UNICRI.
The Coalition's goal is to ensure that AI is designed and governed with children's best interests at its core. By working across disciplines, it accelerates safe, equitable, and child-centered innovation.

Credits

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EXECUTIVE SUMMARY

The 2025 PISA results recorded the lowest average performance ever observed across OECD countries in science, reading, and mathematics, extending a decline in reading that began well before Generative Artificial Intelligence ("GenAI", or "AI") reached classrooms. Governments are responding in different ways with some scaling instructional technologies, while others are moving to restrict access. Sweden, Finland, Denmark and France have restricted phones during school hours for non-instructional use and Sweden has returned to printed textbooks. GenAI is now part of this divide. In 2026, Norway, New York City and Los Angeles restricted students' direct use of GenAI; while since 2025, Estonia and India have expanded AI tools or curricula. This 'deploy or restrict' framing leaves open the questions this report addresses. Which uses and designs of GenAI support children's learning, development and wellbeing, under what conditions and for which educational purposes? And what should governments, schools, and partners put in place while evidence on age-appropriate use is still being built?

Answering these questions requires consideration of the fundamental nature and purpose of school. In line with philosopher Gert Biesta's view of schooling (2009, 2020), we distinguish three purposes that schools pursue simultaneously: (i) qualification (knowledge, skills and dispositions); (ii) socialisation (entry into a society's shared history, values and rules, and life alongside peers from other backgrounds); and (iii) subjectification (becoming a subject who reasons independently and takes moral responsibility for their actions, rather than an object that executes instructions). While AI tools may support aspects of qualification, the growing availability of information outside school makes schools' roles in socialisation and subjectification even more important.

Early evidence on AI and learning is now emerging. The relationship is complex, depending on how AI is designed for educational settings, how and for what purpose it is used, and how students are equipped to use it (OECD, 2026b). Nonetheless, PISA's first data on 15-year-olds' GenAI use suggest that it may not favour learning. Students who do not use AI chatbots for schoolwork generally outperform those who do, and gains from thoughtful use are modest and vary with demographic factors (e.g., socio-economic status, immigrant status, and gender). The most favourable results were observed among students who reported regularly using AI to support their learning while also having opportunities to develop AI literacy at school, though even this group scored only slightly higher than non-users. These findings do not establish whether AI use improves learning, highlighting the need for stronger evidence as deployment expands.

Whichever path governments take, 'deploy or restrict', the underlying task would be the same: preparing children to learn, socialise, and take part in civic life in environments that digital technology increasingly shapes. AI may create real opportunities for personalised learning, creativity and inclusion, but may also present substantial risks, including cognitive offloading, emotional dependence, image-based abuse such as sexualised deepfakes, misinformation and new forms of inequality. Schools have faced this challenge before with digital literacy (DL): the composite competence that enables individuals to access, evaluate, create, and share information safely, responsibly, and critically in digital environments. As society went digital, many education systems incorporated digital literacy into their curricula. Yet, only about half of countries worldwide have defined the digital skills they expect learners to acquire (UNESCO, 2023b). AI literacy, the set of competences needed to understand, use, and evaluate AI critically, is the newest layer of that task.

Research has historically examined digital and AI literacy separately. As the forthcoming PISA 2029 assessment of Media and AI Literacy (MAIL) will do, this report brings them together, building on the foundations of decades of media and information literacy (MIL). Experience with digital literacy therefore shows what helps new literacy programmes succeed in schools and what makes them fail.

This report is produced by iRAISE, a multi-stakeholder alliance for beneficial AI for children co-led by everyone.AI and the Paris Peace Forum. Its scope focuses on school-based digital and AI literacy in primary and secondary education (K-12), because schools remain a universally accessible and accountable institution in young people's lives. Adult and lifelong digital literacy are addressed in the report only where they shape children's environments. Our focus on literacy does not shift responsibility for AI harms onto children, families or teachers. Companies must design and deploy AI that respects

children's rights, and governments must set and enforce rules that hold them accountable (UN Committee on the Rights of the Child, 2021). Yet even the safest tools can impact how children learn, how teachers teach, and what schools assess. Safety by design limits the harm AI products can cause, while AI literacy, the focus of this report, equips children, teachers and families to understand, question and use AI to support learning, development and democratic life.

With AI already widely used in schools and homes, we take a human-centred and pragmatic approach to help decision-makers act while longitudinal evidence on its learning impacts develops. We believe that AI should support and not replace the relational, ethical, and motivational roles of teachers, caregivers, and peers.

Drawing on a structured review of global evidence and consultations with government officials, NGOs, and experts in France, Canada, Egypt and Qatar, the report is written for governments, schools, regulators and funders, and sets out the conditions under which EdTech and AI providers can contribute positively to AI literacy (Table 1 and Box 10).

KEY FINDINGS

The findings move from the human relationships at the heart of learning to the systems that sustain them:

1. **Human relationships remain an irreplaceable condition for learning and teaching in the AI era.** Learning is socio-affective as well as cognitive: middle-school students who perceive their teachers as caring, report both stronger mastery goals and emotional engagement in the subject (Adler & Virat, 2022). Students' enjoyment is also linked to how much they perceive their teacher to enjoy the subject (Frenzel et al., 2009, 2018). Meanwhile, teachers also draw meaning from these relationships: US educators say their strongest sense of meaning at work comes from their interactions with students (Brenan, 2026). Teachers and caregivers therefore need to remain active anchors of accountability, trust, and feedback. As GenAI can now answer students' questions directly, schools must still teach core content but increasingly also how to learn (Houdé & Borst, 2018). AI systems should therefore be designed as supports for human pedagogy, not replacements for it.

2. **Schooling has a collective civic function that must be protected in the AI-era.** Beyond individual skill development, schools provide shared references that sustain belonging, disagreement, and collective reasoning in communities. Much of this socialisation happens outside the syllabus, in the hidden curriculum of living, interacting, and making friends with peers from different backgrounds, and in a protected space where young people can raise complex, sometimes uncomfortable questions that may have no right answer. If digital pathways become too fragmented, especially through personalised learning, we risk weakening the common cultural and civic ground that social cohesion and democratic dialogue require.

3. **What makes school-based digital literacy programmes effective is well documented, but unevenly implemented.** Evidence points to three pillars: (i) **resources,** comprising teacher training, infrastructure, partnerships, and dedicated time in the timetable; (ii) **content design**, through curricula that are theory-based, inclusive and cross-curricular; and (iii) **pedagogical strategies**, including age-tailored, sustained, and well-assessed interventions. Time is a resource most easily overlooked: curricula, teacher training and materials will have only limited impact unless schools reserve time to teach digital and AI literacy, through dedicated lessons or projects across subjects. Schools must also decide what existing content or activities will be reduced or replaced to make room (Section 2.1.1). Teachers' own digital competence and confidence are consistently positively correlated with how well they foster students' digital skills (Hatlevik, 2017; Lorenz et al., 2019). Yet, many teachers across OECD countries, report lacking the preparation to use AI in their teaching, and what they most commonly report as a learning need is skills for using AI (OECD, 2025b).

4. **Digital and AI literacy frameworks are abundant, but their translation into curricula and classroom instruction lags behind while their effects on students are rarely measured.** Competency frameworks such as DigComp and France's CRCN describe what students should be able to do; curricula turn them into sequenced learning experiences. There is a gap between recognising MIL in national policy and including it in school curricula. UNESCO's 2025 mapping found that 171 of 194 Member States referenced MIL or related competences in national frameworks, but only 84 (43%) included MIL elements beyond technical digital skills in school curricula (UNESCO, 2025). Few education systems track whether students actually acquire these competences (Section 1.5). Two recent US evaluations found that programmes improved students' knowledge but changes in behaviour were mainly observed among older students (Jones et al., 2024, 2026).

Without explicit AI-literacy components, including critical engagement with AI-mediated content, data rights and algorithmic bias, GenAI may encourage over-reliance rather than learning: by removing the effort and errors through which students learn, it can raise performance during practice while lowering what students can do on their own (Bastani et al., 2025). Implementing and measuring these programmes would benefit from a robust global research effort.

5 **NGOs and universities act as "human infrastructure" for digital and AI Literacy.** They translate national or regional strategies into lived experiences for children, families, and teachers. NGOs and universities play an essential role in reaching marginalised youth, supporting parents and delivering evidence-informed programmes on digital safety, AI awareness and media literacy. Their work is often constrained by project-based funding and limited capacity to evaluate its impact. They provide critical bottom-up information on how DL strategies are received and how they perform (Section 3.3).

6 **Effective digital and AI literacy require inter-ministerial collaboration, with the education ministry as coordinator.** No single ministry alone can govern GenAI as it reaches almost every domain of children's lives and its use cases encompass education, information and communication technology, health, child protection, interior and justice, social affairs, and culture. The most coherent systems in our case studies designate a clear coordinating authority, typically the education ministry (at regional level in federal systems), with standing mechanisms for cooperation, so that curriculum, infrastructure, connectivity, online-safety and data-protection policies are designed together and adapt as quickly as AI capabilities and uses evolve. NGOs and technology providers contribute within this framework (Finding 5; Box 10).

7 **Our four country case studies reveal contrasting governance models, but in all of them, human factors (teacher confidence, parental mediation and community trust) matter as much as policy design.** France combines a strong sovereign framework (a competence framework called CRCN, the Pix certification and a data-protection gateway called GAR) with territorial inequalities and a teacher-training bottleneck; Canada combines NGO programmes with broad reported reach but unmeasured depth, funded through time-limited grants, with fragmented coordination; Egypt has scaled infrastructure rapidly but faces equity gaps, teachers' anxiety about technical failures and parental distrust of digital learning; Qatar has closed the access divide but now faces wellbeing concerns and a shortage of Arabic-language AI content. In all four, infrastructure and content alone have not guaranteed effective outcomes (Chapter III; Appendices A–D).

IMPLICATIONS AND INVESTMENT PRIORITIES

The report identifies six priorities for schools, governments, regulators, AI developers and EdTech providers, and funders including philanthropies, multilateral and industry actors who fund education. All six face the same constraint: time. AI tools can reach classrooms before evidence on their effects is available, or before teachers are prepared to use them. The benefits of education investment unfold over years or decades, while political mandates and funding commitments are often much shorter. This mismatch tends to leave long-term investments underfunded, such as teacher training, evaluation, and programme continuity (Chapter IV). The priorities below therefore favour commitments that can outlast political cycles: multi-year funding, recurrent budget lines and investment in human capacity. They complement public investment in regulators able to audit AI products used by children.

The following priorities are organized around the same logic as the key findings: from the individual systems that support children to the broader ecosystem, ending with our recommendation of a Universal Learning & AI Literacy Toolkit:

1. **Investing in teachers, their training, and in dedicated time for digital and AI literacy.** Teachers should help design curricula as it helps reflect classroom needs and build confidence in programme design. Training should begin in initial teacher education and continue throughout their careers, within paid working time. All teachers need training relevant to their subjects, with deeper preparation for those teaching digital and AI literacy. They also need safe, open or sovereign AI tools for planning lessons, administration and supporting students with special educational needs. Human oversight and relational mentoring in AI-mediated learning, as well as preserved shared references and collective discussion across students should be required by funders. Training and tools reach students only if digital and AI literacy has a defined place in the schedule: systems must decide whether it becomes a subject, is integrated into existing ones or become cross-curricular projects, and what it replaces (Section 2.1.1). This decision also shapes curriculum development, evaluation and alignment with AI competency frameworks.

2. **Supporting children's wellbeing through healthy digital habits and protected time offline,** such as protected daily outdoor and nature time, sleep-supportive routines, and explicit lessons in emotional awareness and self-regulation with planned screen-free periods (Section 4.2). Funders and governments can embed this by adopting "wellbeing-by-design" standards for schools and EdTech, financing outdoor and play infrastructure alongside digital infrastructure, and aligning school and home measures.

3. **Strengthening measurement and research.** Fund longitudinal studies to understand how AI affects children's skills, wellbeing, resilience and ability to think independently, and how these effects differ across groups. Evaluate curricula and teaching, and support age-appropriate assessments such as PISA 2029 MAIL for 15-year-olds. AI is becoming more capable while evidence on its risks is slow to study and hard to assess; public research agencies, philanthropic funders, and multilateral bodies all have a role in closing this gap.

4. **Sustaining the last mile by treating families, communities and the organisations that serve them as core infrastructure**. Provide multi-year, flexible funding to organisations delivering digital and AI literacy programmes, especially in underserved communities. Funding should reach those doing the work and sustain parent workshops, multilingual resources and community hubs that connect learning at school and at home (Section 2.1.3). Funders should also invest in these organisations' capacity to evaluate impact and to co-design interventions with youth, parents, and educators, recognising that NGOs and community services often provide the relational "last mile" that neither ministries nor technology providers can replicate.

5. **Supporting children's rights-respecting infrastructure and avoiding dependence on a single technology provider.** Promote open standards and privacy-preserving architectures, by favouring local and open-source infrastructure, safeguards and platforms, where possible. This helps education systems avoid platformisation issues such as vendor lock-in, allowing education systems to switch providers. This enables evidence-based decision-making without normalising pervasive surveillance of children.

6. **Seeding a Universal Learning & AI Literacy Toolkit.** Support the co-design and launch of an international AI Fundamentals Programme: free, openly licensed learning materials, quality-assured and adaptable to local languages and contexts. It would train learners of all ages in practical AI use, critical thinking, ethics and rights, leading to a free, vendor-neutral public certification modelled on France's Pix (Box 12). Piloted as a multi-stakeholder, public-interest consortium, this flagship project could serve as a replicable, internationally recognised, interoperable model for certifying AI knowledge across education, employment and lifelong-learning pathways. To ensure equitable access it should be freely accessible: a fee-based course or certificate would create a new barrier for those who cannot afford it.

Throughout implementation, investments should be judged against all three purposes of education rather than learning gains alone: (i) qualification, by building knowledge and skills without encouraging dependence; (ii) socialisation, by maintaining shared learning experiences that foster community, debate and civic cohesion; and (iii) subjectification, by preserving human-in-the-loop educational relationships in which young people learn to think for themselves and answer for their choices.

RECOMMENDATIONS AT A GLANCE

Table 1 summarises the report's six investment priorities by stakeholder. The extended explanations for rationale, evidence and pitfalls are set out in Sections 2.1.1, 3.3 and 4.1 to 4.6.

Table 1. Recommendations by Stakeholder

Schools and Teachers	Governments and Ministries	Regulators	AI Developers and EdTech Providers	Funders and Partners
Teachers and Dedicated Time to Teach (Sections 2.1.1 and 4.1)				
Co-design curricula; Decide whether and how GenAI serves their teaching, while keeping their own relational, ethical and evaluative responsibilities; Use AI toolkits safely for lesson planning and administration; Facilitate collaborative civic practices (group verification, deliberative protocols).	Decide whether DL and AI literacy is a subject or is integrated into existing ones, set hours per stage and state what it replaces; Build a distinct, modular and evolving teacher programme differentiated by role and by age-groups taught; Train pre-service and in-service teachers within paid working time; Embed DL and AI literacy in initial teacher education and professional standards (e.g., through micro-credentials); Prioritise multilingual, culturally adapted training; Provide open or sovereign AI toolkits for teachers.	Require human oversight of AI-supported decisions on assessment and student placement; Check that AI tools offered to teachers protect students' data privacy and are backed by independent evidence of efficacy.	Co-design AI tools with teachers and learning scientists; Design age-appropriate tools that guide students rather than supply answers, and that support rather than replace teachers' relational, ethical and evaluative roles; Disclose whether learning content is AI-generated or designed by learning experts; Never automate high-stakes decisions such as grading or educational placement.	Accept tools only if they are open, privacy-preserving, and non-discriminatory; Provide catalytic support for teacher training, including micro-credentials.
Wellbeing (Section 4.2)				
Protect daily outdoor time; Teach sleep hygiene, emotional awareness, and self-regulation; Plan screen-free periods.	Fund outdoor, nature-based and play infrastructure alongside digital infrastructure; Build healthy digital habits and align school and home measures.	Adopt wellbeing-by-design standards for schools and EdTech.	Apply wellbeing-by-design: avoid engagement-maximising features, false claims of humanhood and simulated intimacy for minors; Connect young users to human support in a crisis; Enforce age-appropriate access.	Back longitudinal research on high screen exposure; Provide teachers with educational resources and training on sleep, attention, and emotion regulation.
Research and Assessment (Section 4.3)				
Build capacity to teach and assess AI-literacy skills; Use formats that make reasoning visible (oral defences, team inquiry, process rubrics); Feed classroom evidence back to ministries.	Align curricula with MAIL competences; Survey caregivers, teachers, and students regularly; Track children's skills, wellbeing, resilience and ability to think independently, broken down by gender, socio-economic background and location; Fund 5–10-year longitudinal studies and independent evaluations.	Protect children's data in assessment and research; Expect providers to cooperate with independent evaluation of privacy and efficacy (Box 10).	Cooperate with independent longitudinal evaluation; Submit products to independent third-party audits of their behaviours with children, across repeated interactions and product updates, rather than relying on self-reporting; Give vetted researchers access to relevant data; Back efficacy claims with independent evidence.	Fund 5–10-year longitudinal studies and independent evaluations; Require child-rights and data-protection safeguards, and independent evidence of efficacy, as conditions of support.

Schools and Teachers	Governments and Ministries	Regulators	AI Developers and EdTech Providers	Funders and Partners
The Last Mile: Families, Communities and NGOs (Sections 3.3 and 4.4)				
Offer parent workshops, accessible guidance, and two-way communication with families; Work with local NGOs and community services.	Treat family engagement as core infrastructure; Produce resources in all locally relevant languages; Make funding for delivery organisations multi-year and recurrent, whether national, regional or local.	Ensure that children's AI products give families clear information on data use and on the evidence behind efficacy claims.	Give families clear, accessible information on data use, safety features and the evidence behind efficacy claims; Localise content genuinely rather than merely translate it.	Provide multi-year, flexible funding that reaches delivery organisations; Build their capacity to evaluate impact and co-design with youth, parents and educators; Fund family DL resources and community hubs with trusted local partners.
Interoperability and Infrastructure (Section 4.5)				
Prefer tools that meet the requirements in Box 10; Report technical and usability problems to the coordinating body.	Designate a coordinating body (national or regional); Promote open standards and favour local and open-source platforms where possible.	Ensure public oversight of private-sector participation; Prevent vendor lock-in and pervasive surveillance of children.	Adopt open standards and avoid lock-in; Protect students' data by design, without using it to train models or build commercial profiles.	Support system-wide interoperability rather than platform-specific adoption; Finance privacy-preserving data repositories.
Universal Learning & AI Literacy Toolkit (Section 4.6)				
Integrate the programme and its certification into existing school pathways; Encourage teachers to take it themselves.	Lead a public-interest consortium; Keep materials and certification free for learners; Allow local adaptation of materials around a common certified core; Embed certification in school, university and adult-training pathways.	Keep materials and certification vendor-neutral and aligned with public-interest frameworks (e.g., UNESCO guidance, MAIL).	Contribute in-kind support only under interoperability, privacy and vendor-neutrality conditions; Keep products and branding out of programme and certification content.	Provide catalytic grant funding; Accept industry in-kind support only if interoperability, privacy, and vendor-neutrality requirements are met.

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