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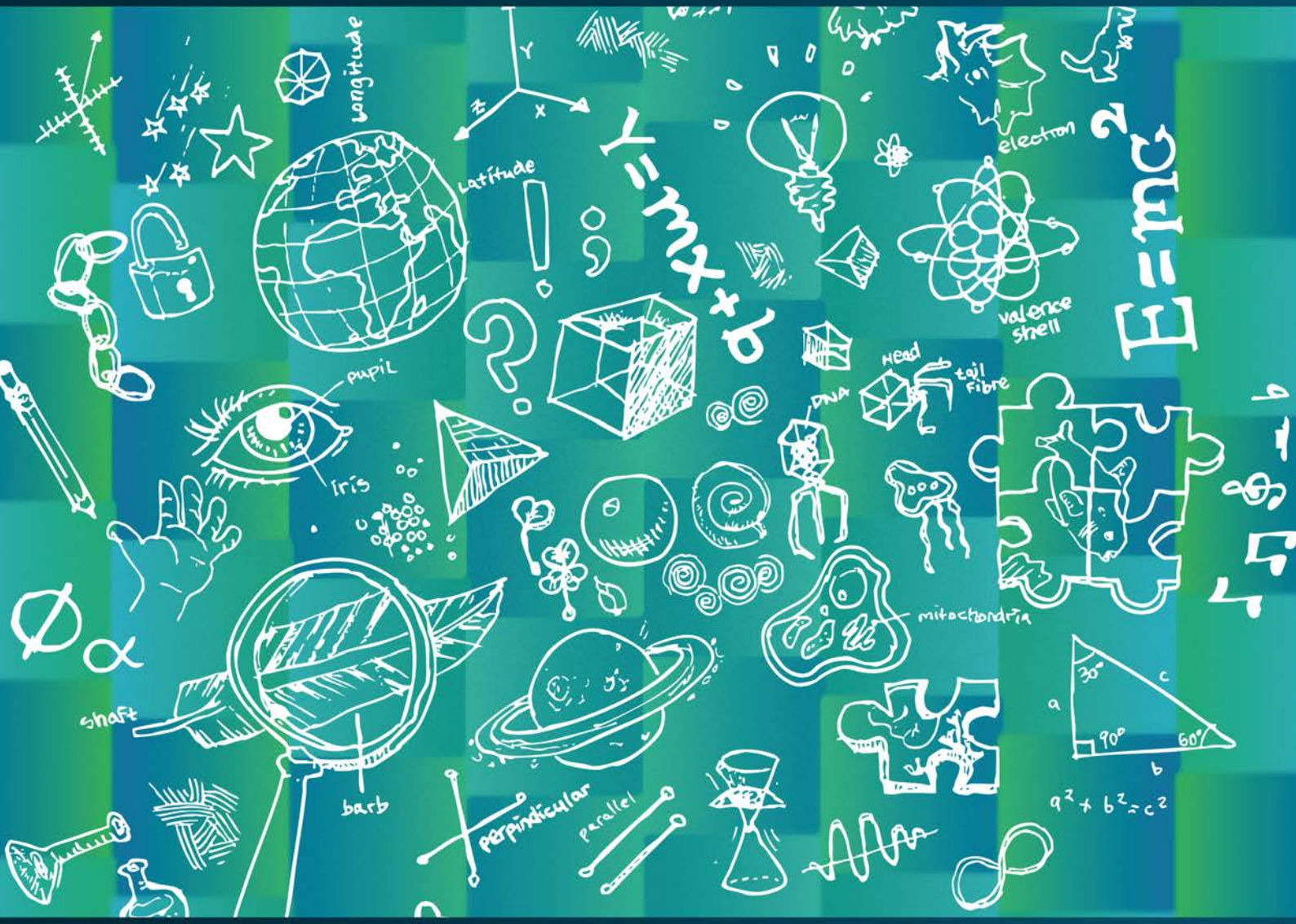
FII INSTITUTE Future Investment Initiative Institute — Impact on Humanity

Columbia Climate School
Center for Sustainable Development

NON-NEGOTIABLE SKILLS IN THE FUTURE OF EDUCATION WITH AI



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Executive Summary

"The growing capabilities of AI—particularly Large Language Models and generative AI systems—are placing unprecedented pressure on education systems and forcing a deeper question: what does it mean to be people and active citizens, and a society of care when machines can increasingly mimic our work, our knowledge, and maybe… our thinking?" (UNESCO, 2024 Recommendation on the Ethics of AI and Guidance on Generative AI in Education).

Artificial Intelligence (AI) is transforming education at unprecedented speed. As large language models and generative AI become increasingly integrated into teaching, learning, and assessment, education systems face a deeper question: not only how to adapt to these tools, but what they must continue to preserve as distinctly human.

This report argues that the future of education in the age of AI depends on protecting and strengthening non-negotiable human skills: the capacities for judgment, creativity, ethical reasoning, empathy, and reflection that remain essential to human development, responsible citizenship, and meaningful work. Drawing on research and case studies from diverse contexts, it offers actionable guidance for educators, institutions, and policymakers seeking to make informed and human-centered choices about AI in education.

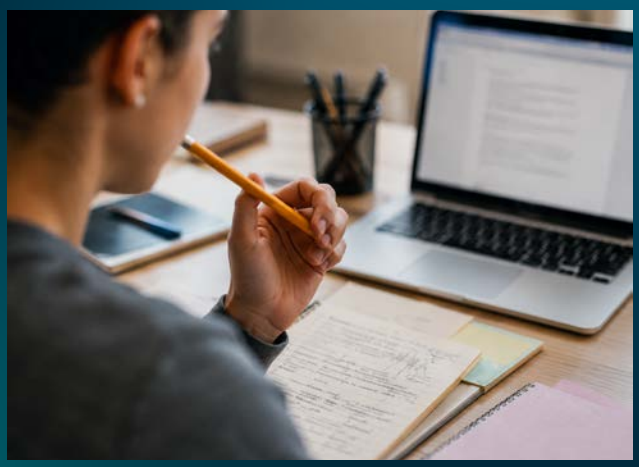
The rapid expansion of AI compels education systems to examine how these technologies are reshaping the conditions for learning, teaching, and personal development. The case studies in this report show that while AI can expand digital capabilities and accelerate access to information, education must not lose sight of the human capacities that remain fundamental to learning and the future of work. Through this joint initiative, the FII Institute and Columbia University advance a balanced approach to AI in education—one that is practical and hopeful, addresses real-world challenges, strengthens cultural and sustainable futures, and ensures that people remain in control of the technologies meant to support them.

Non-Negotiable Human Skills

Non-negotiable skills are those that cannot be abandoned or compromised as AI penetrates teaching and learning dimensions. These are the capacities AI cannot and should not replace—and which education must actively protect, teach, and practice. As AI grows increasingly capable, the question is no longer what AI systems can do—but what remains irreducibly human. These are not only soft skills; they are the cognitive, emotional, and moral capacities that make us effective, ethical, and fully alive. Education systems that fail to teach them are not just incomplete—they will produce people unprepared for a world of work with AI as a learning and teaching tool.

- **Critical Thinking & Independent Judgment:** the ability to question sources, detect bias, weigh evidence, and reach conclusions that aren't inherited from an algorithm or an authority. AI can surface information, but it cannot teach a person to rigorously interrogate it. Students must practice forming and defending positions, changing their minds for good reasons, and resisting the pull of whatever answer they find from AI resources.
- **Ethical Reasoning & Moral Courage:** knowing the right thing to do is rarely a logic problem. It requires sitting with competing values, understanding consequences of decisions on people, systems, and institutions, and understanding the courage to act against social pressure or personal interest and the consequences of doing so.

- **Deep Empathy & Human Connection:** the capacity to understand another person's experience and not just model it but also adapt from it. Empathy is the foundation of trust, care, leadership, and community. It develops through real (human) relationships, conflict, vulnerability, and repair. It cannot be automated or shortcut.
- **Creative & Original Thinking:** not creativity as decoration, but as problem-solving—the ability to make unexpected connections, challenge assumptions, and generate ideas that didn't exist before. AI recombines what it has seen and processed. Humans can imagine what has never existed and can be driven by genuine curiosity, obsession, and vision.
- **Communication & Persuasion:** the ability to express complex ideas clearly, read a room, adapt a message for an audience, and move people through language and presence, which includes active listening and adaptability. These are skills built through practice, feedback, and human interaction, not simply through prompting a chatbot.
- **Resilience & Adaptive Problem-Solving:** the ability to face uncertainty, tolerate failure, and keep functioning when there is no clear answer. AI operates within defined parameters. Humans must navigate ambiguity, recover from setbacks, and find new paths when every known option has failed. This is built through challenges in teaching and learning in an educational setting.
- **Self-Knowledge & Metacognition:** understanding how you think, where and when you are wrong, what biases you carry, and how to learn from experience. Metacognition, or "thinking about thinking," involves planning, monitoring, and evaluating one's own cognitive processes to improve performance. It also involves self-correcting mistakes or realizing you are overthinking a decision.
- **Collaboration & Social Intelligence:** working effectively with people who are different, difficult, or in conflict with you. Navigating power, building consensus, giving and receiving honest feedback. These skills are forged through learning in group dynamics—they cannot be developed in isolation or by interacting only with tools designed to be agreeable.
- **Civic & Democratic Literacy:** understanding how power works, how decisions get made, and how to participate meaningfully in collective life. Democracy is not self-perpetuating; it requires citizens who can think critically about institutions, engage across differences, and take responsibility for the consequences of their choices.
- **The Will to Learn & Intellectual Humility:** the drive to keep learning, the comfort with not knowing. In a world of accelerating change, the ability to unlearn and relearn is more valuable than any fixed body of knowledge.



AI-Adjacent Skills: Essential Competencies for Effective Collaboration with AI

AI-Adjacent Skills are the competencies and abilities individuals require to work effectively alongside Artificial Intelligence systems. These skills are not about supplanting human judgment; rather, they focus on empowering humans' purposeful and critical direction of AI technologies.

Learners equipped with these skills:

- **Understand AI Capabilities:** comprehend the strengths and limitations of AI tools to use these technologies effectively across various contexts
- **Interpret Data:** analyze and interpret AI-generated data outputs to foster informed decision-making
- **Understand Ethical Considerations:** recognize and address the ethical implications of AI use, ensuring responsible and fair applications of technology

- **Collaborate to Problem-Solve:** work collaboratively with AI systems to address complex tasks, enhancing learning through human-AI partnership
- **Critically Evaluate:** critically assess AI-generated suggestions or outcomes, ensuring that human oversight is maintained in decision-making processes
- **Optimize Prompt Design**—crafting inputs that yield precise, relevant, and useful AI outputs
- **Obtain AI Literacy**—understanding what AI is, how it generates responses, where it fails, and how to use it responsibly
- **Retain Data Fluency**—interpreting how AI systems process information and applying that understanding across education and professional contexts
- **Improve Critical and Reflective Thinking**—actively designing one's own learning pathway and evaluating what is being gained or lost in the process
- **Optimize Processes**—using AI to handle routine tasks and free up cognitive energy for higher-order thinking and work
- **Collaborate Mindfully**—treating AI as a tool to be critically refined through human judgment, not a source of answers to be accepted uncritically

This report advocates for an approach to AI in education that complements rather than diminishes the agency of teachers, learners, and workers. Its goal is to offer actionable insights that ensure AI integration strengthens, rather than erodes, authenticity in education and work performance.

Our findings draw on three established perspectives in education research and frameworks: (1) digital skills and competencies, (2) pedagogical practice, and (3) societal values dependent on local culture, suitability, and global citizenship. Some key pedagogical practices that emerge include understanding key distinctions between aspects that can be digital and others that should be non-digital (analog). Experiential, applied learning, and reflective learning should be prioritized in classrooms. Other practices such as handwriting, journaling, goal-setting activities, self-assessment tools, mindful practices, and creating portfolios are ways of supporting self-directed and personalized learning. The report also emphasizes building systems-thinking approaches through interdisciplinary studies. Regular class discussions are encouraged to support collaborative learning: pedagogical techniques such as active listening, group projects, cooperative learning, role-playing, peer mentoring, and problem-based learning. These and other pedagogical techniques that align with ethical reasoning, which develop critical thinking by keeping creative and original thinking intact, need to take place in all teaching and learning environments.

Through these lenses, we examine the pressures created by generative AI—a technology whose rapid development has often outpaced society's understanding of how models produce their outputs, and whose adoption in education has too often been driven by efficiency and novelty rather than intentional pedagogy. This is precisely why education must broaden its vision—championing non-negotiable human skills that no algorithm can replicate.

The Core Argument

The issue with the introduction of AI in educational environments is not *how much* learners and professionals use AI but *how* they use it and whether that use deepens or diminishes their human capabilities. AI's opacity—the fact that even its creators cannot fully explain how it produces outputs—makes intentional, human-centered design in education not a preference but a necessity. Education systems that allow efficiency to drive AI adoption, without a corresponding commitment to human skill development, risk producing graduates who are capable with tools but are underdeveloped as thinkers, and citizens with capacities.

Readers' Guide to this Report

This report draws on the deliberations of the Center for Sustainable Development's Task Force on AI and Education at Columbia University, which is part of a larger initiative on "AI and the Future of Work," and which has been examining these issues for more than two years, as well as the Future Investment Initiative Institute's Future of Work project. Since its inception in 2024, the Task Force has published major reports examining how AI is reshaping teaching and learning in higher education and influencing education policy in selected countries. It has also considered the broader implications of AI for education and the future of work, including shifting skill demands and widening inequalities in development. In doing so, the initiative underscores the

critical role that education systems and institutions such as Columbia University can play in shaping a more inclusive and human-centered response to AI, particularly by:

Understanding the opportunities and challenges that AI presents across different educational settings and for their stakeholders.

Sharing knowledge and insights: facilitating knowledge sharing and exchange of insights among stakeholders worldwide, current trends, research findings, and best practices related to AI and the future of work.

Discussing policy, planning, and implementation for integrating non-negotiable skills across the education ecosystem. Policymakers and ministry-level education planners can use this framework to rethink assessments, classroom practice, teachers' professional development, and broader strategies for the future of education in the age of AI.

→ **The report clearly demonstrates that education systems should begin designing proactive curricula now, rather than waiting for AI integration to become more deeply embedded in policy and practice. If education is to preserve and strengthen essential human capacities in the age of AI, curriculum reform must anticipate technological change rather than react to it after the fact.**

This report's focus is on essential skills that learners need to build and retain in this ever-changing landscape of education with the use of AI. The report's Case Studies exemplify the context and background for the essential "non-negotiable skills," skills that must be continually developed alongside the development of tech innovations such as AI. The Case Studies help build the depth and range of the skills that humans can best optimize with AI while accounting for the essential criticality of these technologies' limits. We have categorized these skills into negotiable and non-negotiable skills.

Over the past two years, the Task Force has compiled a table (see Table 2 in the Appendix) of non-negotiable skills, setting out their definitions, associated competencies, pedagogical approaches, development and assessment methods, and intended learning outcomes. Together, these elements provide actionable guidance for educators, institutions, and policymakers seeking to make informed choices about the role of AI in education.

Negotiable skills are those that have a high likelihood of being altered, either completely or partially, with greater use of AI. Non-negotiable skills are those that AI cannot meaningfully develop on behalf of learners and must therefore continue to be cultivated deliberately as education systems adopt AI. These skills should remain embedded in pedagogical practices that require sustained human effort and reflection. Slower forms of learning, such as handwriting, can support cognitive processing and deeper engagement, which is why education systems should create intentional spaces for the development of these non-negotiable skills.

> *In this age of AI, non-negotiable skills are understood not as technical or transferable competencies, but as ethical–cognitive capacities that underpin human agency, judgment, and responsibility. These skills are considered non-delegable, insofar as their systematic outsourcing to Artificial Intelligence entails not merely gains in efficiency, but a qualitative erosion of Human agency, autonomy, moral discernment, and reflective thought* (*Harari, 2025a*).

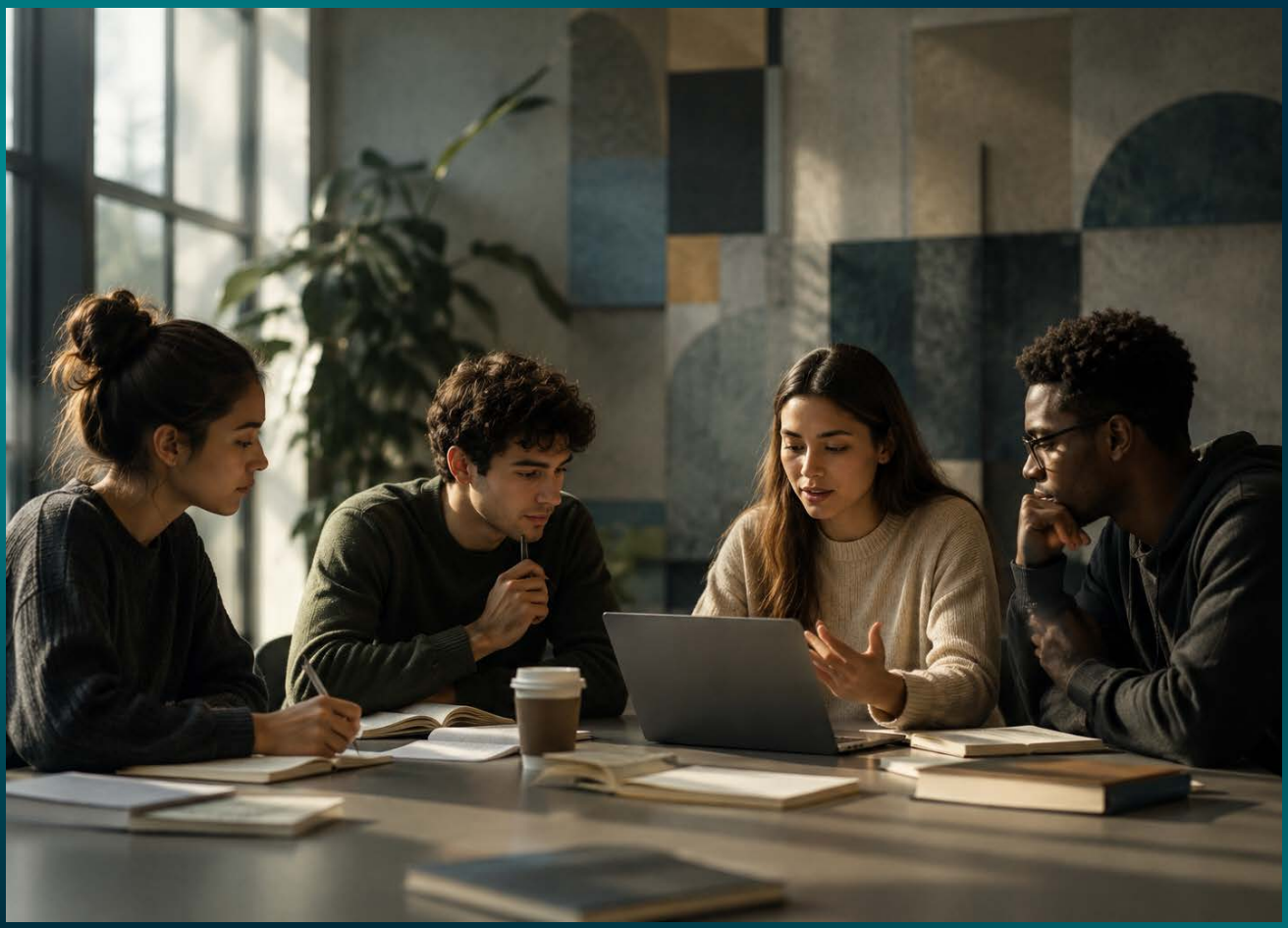
Although the Task Force has not developed a full curriculum framework for cultivating these skill sets, the report clearly demonstrates that education systems should begin designing proactive curricula now, rather than waiting for AI integration to become more deeply embedded in policy and practice. If education is to preserve and strengthen essential human capacities in the age of AI, curriculum reform must anticipate technological change rather than react to it after the fact.

The case studies highlighted in this report show how students, lifelong learners, and professionals are already engaging with AI across a wide range of educational systems, including in countries that are only beginning to introduce AI into teaching and learning. Spanning diverse regions, cultural settings, and digital environments, they reflect a broad variety of tools, practices, and policy contexts. At the same time, access to digital and AI technologies remains highly uneven. The selected case studies therefore aim to capture differences in socioeconomic background, geography, age, and patterns of use, so that the discussion of AI-related skills remains grounded in context.

Within this report, the distinction between AI-adjacent skills and non-negotiable human skills is clearly defined as an analytical framework. However, its practical application is not entirely static. Depending on context, educational level, technological access, and patterns of use, some skills may be emphasized differently or may sit closer to the boundary between the two categories. The framework is therefore intended not as a rigid taxonomy, but as a guide for interpreting how education systems can protect essential human capacities while equipping learners to work thoughtfully and effectively with AI.

The purpose of this report is not only to examine the rapid expansion of AI in education, but also to understand its varied applications, their limitations and risks, and the consequences of both using and not using AI tools across different levels of education. The report asks what kinds of skills education systems must now prioritize, and how these skills can be developed through thoughtful pedagogical practice.

Its primary audience includes teachers, educators, professors, and facilitators working in both formal education and lifelong learning. It is also intended for all parents and guardians of children and adolescents who are interested in, or concerned about, the skills learners will need in the age of AI. More broadly, the report is designed to clarify the skill sets most necessary in this new educational landscape and to explore how they can be cultivated through varied and intentional pedagogies.



Introduction

"Practical wisdom is a truth-attaining rational quality, concerned with action in relation to things that are good and bad for human beings."

— Aristotle, Nicomachean Ethics, Book VI, 1140b

The contemporary era of Artificial Intelligence (AI) brings to the fore profound philosophical and social challenges, in which technology functions not merely as a tool but as a structural factor that reshapes human learning from books and teachers. To comprehend the notion of non-negotiable skills, we recall Aristotle, who conceived of education as the capacity to judge and act virtuously within complex and uncertain circumstances. In the age of AI, this distinction becomes crucial: technology may provide information and technical proficiency, but serious concerns arise when AI begins to shape human judgment, weaken critical thinking, or diminish moral discernment.

Every technology transforms not only how we do something, but also what we consider worthy of doing (Postman, 1985). The central stake here concerns the risk of human thinking-power and outsourcing all the thinking that one does to AI due to a combination of factors including time and trying to be efficient. In the educational field, this translates into an unequal struggle between learning and text production, where the process of gaining experience may be devalued, leading to a generation that knows "how to produce" but not "how to think critically."

Like most major disruptions, AI's impact on education systems is complex, uneven, and rapidly evolving. As these technologies become embedded in education through multiple entry points—including teachers, curriculum developers, students, and institutions—it is essential that all education stakeholders engage with AI critically and thoughtfully. While not every learner will become a machine-learning engineer or prompt specialist, all learners should develop a foundational understanding of when, how, and why to use AI. This requires more than knowing how AI systems work or checking their accuracy; it also means being able to critically assess the information they generate. The non-negotiable skill set summarized in Table 2 (see appendix) and illustrated through the case studies in the appendix reflects this need.

As UNESCO's 2025 report emphasizes, "start every AI adoption discussion with the question: **what do we want learners to be able to do?"** To help education systems keep pace, existing frameworks offer structured approaches to developing AI-related skills among both learners and educators. The goal is not simply to expand AI use, but to ensure that AI supports an ethically grounded curriculum, is approached with critical judgment, and complements rather than replaces human teachers.

For students, the key priorities are to develop an ethical understanding of AI and to engage with its applications across three levels of learning progression: understanding, applying, and creating. For teachers, the key priorities are to use AI to support professional development, lesson planning, and pedagogical practice, while ensuring that education remains human-centered and ethically grounded.

The Changing Role of Artificial Intelligence

The workplace and education systems worldwide are experiencing rapid changes in design, delivery, and implementation with AI. These changes span country systems with varying degrees of adoption. The explosive entry of AI into academic life has radically reshaped the framework within which we learn, teach, and think. AI was once merely a technological horizon inspiring science fiction, with narratives about thinking machines, autonomous systems, and artificial consciousness that functioned not only as philosophical thought experiments but also as implementable pedagogy for everyday use. In 2025, Pew Research found that 57 percent of respondents in the United States viewed AI's societal risks as high or very high. Among this group, the most cited concern was that AI could erode human abilities and social connections, including by making people less likely to think creatively or critically (Kennedy et al., 2025). The survey also found a strong belief that people should be able to distinguish between content created by AI and content created by humans, even though many respondents did not feel confident in their own ability to do so.

AI has transformed into an omnipresent infrastructure of information—free systems enable data retrieval, text generation, communication, and assistance in the generation of information and sources for research projects. It is no longer a fantastical projection nor a future promise; it constitutes a daily experience.

A survey by Digital Education Council Global AI Student Survey found that in 2025, more than half of 3,839 students across 16 countries interact with AI on a daily basis. 86% of students use AI in their studies, with 54% using it weekly and nearly one in four (24%) using it daily. Among other AI tools, the most popular (66%) system is ChatGPT, used mainly for searching information, checking grammar, and summarizing documents. The Pew Research survey in the US (Kennedy et al., 2025) found that:

- 55% of the survey respondents report regularly using AI; 44% say they are not regular users.
- 27% report interacting with AI several times per day or more.
- The number of AI users worldwide is estimated to reach 729.11 million by 2030.

Is AI best understood as a pedagogical tool, an information generator, a substitute for reading, or increasingly, a conversational partner? Or should it replace teachers?

This report asks how the role of AI in teaching and learning can be rethought in meaningful ways that respond both to the rapid evolution of these technologies and to the needs of lifelong learners. The shift from the imagined promise of AI to its everyday use raises a deeper question: which aspects of thought, judgment, and creativity are we willing to delegate to large language models (LLMs)?

As Agyemang-Badu et al. (2025) note, the relationship between AI and ethics in education is far more complex than discussions that focus only on how AI can assist educators or on concerns about student misuse, such as plagiarism. Beyond these pedagogical concerns, and beyond issues of privacy and safety, there is a broader need to understand how AI shapes everyday life, human agency, and the ethical norms that govern education. This also requires attention to wider human rights considerations that extend beyond the classroom itself (Agyemang, Tibbitts & Sage, 2024). For more about the risks of using AI in Education, see the CSD x FII report (2026) *AI and Ethics of Smart Education*.

Agency in the Age of AI

The impact of technology goes far beyond learning outcomes or classroom performance. It also shapes how people see themselves, relate to others, and make sense of the world around them. As Kaplan (2009) notes, the tools we create and use influence our culture, our environment, and the way we live. In this sense, AI is not simply another educational tool. As it becomes more embedded in daily life, it also reshapes social relationships, patterns of behavior, and the boundaries between human judgment and technological assistance.

The key question is no longer whether AI will be used, but how it can be used without weakening human judgment, responsibility, and independent thinking. In environments where AI-generated suggestions, predictions, and responses increasingly shape decisions, education systems must ensure that people remain in control. This report therefore argues for a stronger human-centered approach to AI—one that takes seriously the growing role of algorithms in shaping learning, behavior, and choice, and that addresses the resulting implications for privacy, autonomy, and ethics in education.

Life-long Learning, Transformative Education

Adult education constitutes today the most critical field for understanding digital transition, as AI demands not merely the acquisition of new skills but also learning ideas for shaping the ever-changing workforce patterns. Within the contemporary landscape, exposure to Generative AI often functions as a *disorienting dilemma*, where machine-generated outcomes compel adult learners to question the value of their own cognitive effort and interpretive labor. How much effort should humans put in if the machine-generated outcomes are acceptable?

This transformation will not happen automatically. There is a real risk that AI could reinforce what Paulo Freire criticized as "banking education," a model in which knowledge is delivered to learners as if they were passive recipients rather than active participants in their own learning (Gottlieb and LaBelle, 1991). In the age of AI, this risk takes a new form: students may begin to treat AI-generated responses as ready-made knowledge, accepting them too quickly and too uncritically. That is why the ability to question, verify, and challenge information must remain central to education.

This is where critical pedagogy becomes especially important. Critical pedagogy is an approach to teaching that encourages learners to question assumptions, examine power, and engage actively in the creation of knowledge rather than simply absorb information. As Shor and Freire (1987) argue, education should be problem-posing, not answer-delivery. In practice, this means learners should not use AI simply to retrieve responses. They should use it to test ideas, refine questions, identify bias, and deepen their own reasoning. As Mollick (2024) suggests, this kind of engagement positions learners as active participants in knowledge-building rather than passive consumers of machine-generated outputs. In doing so, they can resist overdependence on AI and preserve the capacity for judgment, choice, and responsibility that will remain essential in the future of work.

Students need to be aware that AI-generated content is hardly ever neutral. Large language models are trained on enormous datasets, many of which come from English-language sources and from digital environments shaped by existing power imbalances in data, infrastructure, and platform development. As a result, these systems can reproduce dominant linguistic norms, cultural assumptions, and patterns of knowledge that are not equally representative of all communities or worldviews. This concern is not about reducing AI development to a single geography or group; it is about recognizing that the structure of available training data, the historical concentration of major technology platforms, and unequal access to digital resources all shape what these systems produce.

As a previous FII report noted, speakers of different English varieties, including Nigerian, Indian, or Aboriginal English, may find their vocabulary, grammar, or expression corrected toward more standardized forms. This can reinforce the idea that some ways of speaking and knowing are more legitimate than others. In this sense, AI bias is not only a technical issue. It is also an educational and geopolitical one. As Nyaaba et al. (2025) argue, such systems can distort learners' understanding of the world and reproduce existing knowledge hierarchies. This raises broader concerns about algorithmic dependence, digital colonialism, and AI sovereignty, especially if countries in the Global South are expected to rely primarily on tools built elsewhere and trained on data that may not reflect their own languages, contexts, or priorities (Ahmed, 2026; Hassan, 2023)

Can a language model trained largely on Anglo-American texts produce stories that feel genuinely rooted in other cultural contexts? Rettberg and Wigerswe (2025), at the Center for Digital Narrative at the University of Bergen, tested this by generating 11,800 stories—50 for each of 236 countries—using OpenAI's GPT-4o-mini model licensed through MIT University. Their findings are important for education. Although the stories included national symbols and familiar cultural references, most still followed the same basic narrative structure across countries.

This suggests that while LLMs can reproduce the appearance of cultural specificity, they may still flatten deeper differences in voice, history, and perspective. For teaching writing, that is a serious limitation. It reinforces concerns already raised in other studies about stereotypes in AI-generated content, while also pointing to a broader pattern: similarity of plot across contexts. In this dataset, stories tended to favor stability over change, pushed major conflicts such as war into the background, and often resolved problems through a protagonist leading a community organization.

In the educational landscape of 2026, the real measure of learning is no longer simply how quickly students can produce answers. It is whether education continues to build judgment, self-awareness, and social responsibility in a world increasingly shaped by AI. The key question is not only what students or early-career researchers can generate, but how they think, decide, and act within technology-mediated environments. As Biesta (2010) reminds us, education always involves the "beautiful risk" of helping people become subjects in their own right. In the age of AI, that means ensuring learners remain thinking, ethical, and socially responsible human beings, rather than passive users of algorithmic systems.

A recent report of the Brookings' center for universal education, "A New Direction for Students in an AI World: Under three "P"s—Prosper, Prepare and Protect" (Jan 2026), quotes decades of research in developmental science demonstrating that children's ability to learn—including in formal schooling—is shaped by the interconnected growth of their cognitive, social, and emotional capacities.

These domains are mutually reinforcing, what we termed ***Non-negotiable skills***, including:

- Language and executive-function skills that support social interaction
- Emotional regulation that influences attention and persistence
- Social relationships that develop motivation and bonds.

These are the skills we describe as non-negotiable because they cannot be separated from the broader developmental systems within which children grow and learn. The Brookings study examines the role AI plays in children's *cognitive*, *social*, and *emotional* development, both in and out of school, including through their growing interaction with AI technologies (Brookings, 2026).

As potential **benefits** of AI, the *Brookings* report lists:

- Access—AI can improve equity by addressing educational resource gaps and expanding access to education
- Timesaving—AI can optimize teacher time for greater focus on students
- Learning outcomes—AI can improve students' learning
- Personalization—AI can tailor learning to each student's needs
- Accessibility—AI can extend learning to neurodivergent students and students with disabilities
- Assessment—AI can advance assessment

As potential **risks** of AI, the *Brookings* report lists:

- Cognitive development—AI can undermine students' cognitive development
- Social and emotional development—AI can impede students' social and emotional development
- Trust—AI can degrade trust in education
- Safety—AI can threaten students' safety
- Dependence—AI dependence can erode students' autonomy and agency
- Inequality—AI can deepen equity divides

→ The Many Definitions of AI

Artificial Intelligence means different things in different fields, and no single definition captures all of its uses in education. In this report, AI is understood primarily as a tool that can support human learning, not replace it. Following Mollick (2024), we view AI as a form of "co-intelligence": a system that can assist with idea generation, routine tasks, and information processing, while leaving humans responsible for judgment, creativity, and critical thinking. This distinction matters. AI can generate large amounts of content, but information is not the same as truth (Harari, 2025a). Across the case studies, AI includes systems that respond to prompts by generating text, images, audio, video, summaries, and draft documents (Stryker & Kavlakoglu, 2024).

Major uses of AI systems by students and teachers

Currently, approximately nine fee-based AI systems are available to the public, produced by a handful of companies making cutting-edge models. All of them offer some free access. The four most advanced AI systems are Claude from Anthropic, Google's Gemini, OpenAI's ChatGPT, and Microsoft Copilot. Then there are the open weights AI families, which are almost (but not quite) as good: Deepseek, Kimi, Z and Qwen from China, and Mistral from France. Most other AI services offering cutting-edge capabilities (with some free use) are powered by one or more of these base systems. AI versions and types matter significantly because different models have distinct capabilities, performance levels, and limitations that affect their suitability for specific tasks. The choice of AI determines the quality of results, efficiency, and ethical value.

Large Language Models (LLMs) are trained on vast amounts of scanned text. Some of the leading AI large language models are:

- GPT-5.4: OpenAI's latest model, an update from OpenAI's GPT-3 and GPT-3.5 that caused a surge in the popularity of AI
- Anthropic: Claude Sonnet 4.6 Hybrid reasoning model featuring a 1M context window
- BERT: Google's pioneer Natural Language Processing model
- PaLM: Google's latest breakthrough in LLMs
- LLaMA: a collection of foundational language models by Meta

These LLMs are already used in the educational environment for a variety of uses and benefits:

General-purpose generative AI: LLMs such as ChatGPT, Claude, and Gemini function as versatile tools for both teachers and students. These tools are designed to be helpful task replacement tools, prioritizing efficiency. Teachers use them to draft lesson plans, design assessments, and create instructional materials. Students employ them for research assistance, writing support, coding help, and conceptual understanding across disciplines. LLMs vary in the design features used to encourage extended use and engagement on their platforms.

Teacher productivity and planning tools: platforms such as Gradescope, MagicSchool, and Notion support teachers' administrative and instructional workflows. They automate grading and feedback, generate standards-aligned lesson and assessment materials, produce differentiated resources, and assist with documentation such as individualized education plans and progress reports.

Student-facing adaptive and learning systems: AI-powered platforms like MATHia, Knewton Alta, and DreamBox personalize learning by analyzing student responses in real time, adjusting content difficulty, identifying misconceptions, and providing targeted feedback to close knowledge gaps.

Companion platforms: models such as Character.ai and Replika.ai provide users with AI "companions" or "friends" that simulate sustained conversation or interaction with users. They are designed to maximize engagement and extend the time users spend on the platform, by providing sycophantic feedback. They also raise serious concerns about overdependence on non-human advice, particularly when users begin to rely on these systems for emotionally sensitive or high-risk decisions. Such dependence may increase the risk of harm to oneself or others (Dewitte, 2024). There have also been reported cases in which vulnerable young users appeared to rely on AI-generated guidance in dangerous ways[1], underscoring the need for stronger safeguards, oversight, and digital literacy.

Specialized academic and domain tools: subject-specific platforms leverage AI to support mastery in particular domains, such as Duolingo for language acquisition, Photomath for mathematical problem solving, and GitHub Copilot for programming and computational tasks.

Institutional and administrative AI systems: programs used by schools or ministries for predictive analytics, attendance tracking, or early warning systems, such as Civitas Learning, PowerSchool, or PraxiSchool.

AI-enhanced assistive technologies: support accessibility, such as speech-to-text (Otter.ai), text-to-speech, and real-time translation (Microsoft Translator and Seeing AI).

Why AI Versions Matter

Not all AI systems are the same, and education systems should not treat them as if they were. Different models vary significantly in performance, reliability, bias, safeguards, and intended use. For educators and policymakers, this means that adopting AI is not simply a question of whether to use it, but which systems to use, for what purpose, and under what conditions.

First, model performance matters. Newer versions can differ substantially in accuracy, reasoning, and output quality, which means that the educational value of an AI tool depends in part on the specific version being deployed.

Second, different systems are built for different functions. Some are designed to generate content, others to support decision-making or detect anomalies, and newer agentic systems can carry out multi-step tasks with increasing autonomy. Education systems therefore need to match the tool to the task rather than assume that one model fits every learning context.

Third, training data and built-in safeguards matter. Models differ in how they handle prompts, data, and potentially harmful or biased content. Without careful oversight, learners may be exposed to misleading, toxic, or culturally distorted outputs that they may not be equipped to identify.

Fourth, effectiveness also depends on user capability. AI systems do not operate well in a vacuum; they require informed use, which means institutions must think not only about access to tools, but also about the level of AI literacy needed to use them responsibly.

Finally, AI choice is now a policy issue. Different systems raise different ethical, legal, and regulatory concerns, and these concerns are evolving quickly (FII, 2026). At the same time, the landscape is changing fast. As Harari (2025a) notes, competition among AI systems may reshape how particular models come to dominate different sectors. In addition, AI is moving beyond chat-based interaction toward agentic systems that can act across tools and complete tasks with limited supervision. For education leaders, this means decisions can no longer focus only on models in isolation. They must also consider the wider ecosystem of applications, interfaces, and control structures through which AI is deployed. With the rise of agentic AI, these choices will increasingly shape not only teaching and learning, but also institutional strategy and workforce preparation.

Major AI Systems in Higher Education

AI is already deeply embedded in education: 86% of students report using AI in their studies, with 54% using it weekly and nearly one in four using it daily. At the institutional level, adoption is also advancing, with 17% of American universities already using AI in admissions processes. The most popular AI tool among students is ChatGPT, followed by Microsoft Copilot. However, universities are adopting multiple platforms:

MOST WIDELY ADOPTED PLATFORMS

→ **1. ChatGPT (OpenAI)**

- ChatGPT was found to be the most widely used AI tool, with 66% of students using it, and over 2 in 3 students reported using AI for information searching.[2]
- OpenAI announced ChatGPT Edu, with notable adopters including Columbia University, the University of Pennsylvania's Wharton School of Business, and Oxford University.

→ **2. Microsoft Copilot**

- Microsoft Copilot has already been integrated into most education institutions, as it is embedded directly into widely-adopted Microsoft 365 applications.
- Strong advantage for universities with existing Microsoft Azure infrastructure.

→ **3. Claude (Anthropic)**

- Northeastern University has signed on as Anthropic's first official "design partner," offering Claude access to 50,000 students, faculty, and staff across its 13 campuses.
- Early adopters of Claude for Education include Northeastern University, the London School of Economics and Political Science, and Champlain College in Vermont.
- Emphasized for research-intensive institutions focused on writing and analysis.

→ **4. Google Gemini**

- Integration with Google Scholar, YouTube education content, and Google Workspace
- Popular among universities already using Google's education ecosystem, particularly the NotebookLM tool.

→ 5. Perplexity

- The Kogod School of Business at American University partnered with Perplexity to provide Perplexity Enterprise Proto all students, faculty, and staff, supporting the creation of personalized tutors and knowledge hubs.
- The Texas A&M University (Mays Business School) was the first university to collaborate with Perplexity, granting access to all students, faculty, and staff for research and innovation purposes.
- Perplexity is being promoted for academic research with sources and citations, while also offering free Pro access to schools through the "Race to Infinity" campaign and partnerships such as the one with Wiley for educational content.

ADOPTION STATISTICS

UNESCO's survey found:

- 19% of higher education institutions already have a formal AI policy, while a further 42% reported that AI guiding frameworks are under development.
- Regional variations exist, with around 70% of institutions in Europe and North America having or developing guidance, compared to 45% in Latin America and the Caribbean.
- Nine in ten respondents reported using AI tools in their professional work, most commonly for research and writing tasks, with nearly half also experimenting with AI in teaching (UNESCO, 2024).

SPECIFIC UNIVERSITY APPLICATIONS

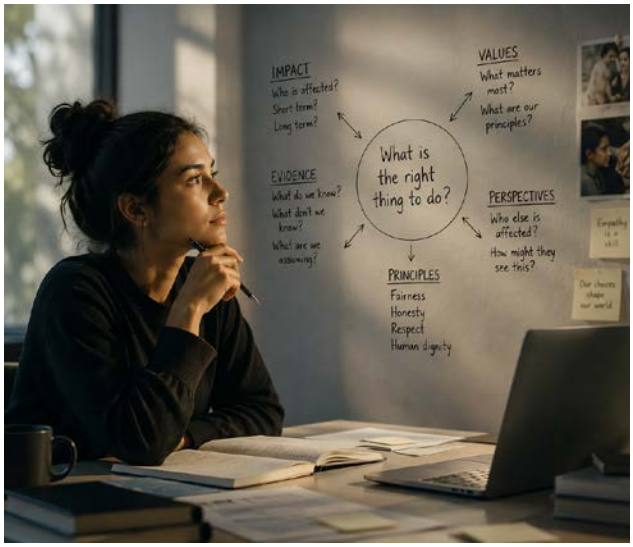
Uses of AI by Universities:

- Virginia Tech has adopted a hybrid model where each application is reviewed by both an AI tool and a human evaluator
- Purdue University uses AI chatbots that handled 82% of initial inquiries, with 71% of those happening outside of business hours
- The University of Sydney, with over 70,000 students, has integrated AI across its academic and administrative functions to promote inclusion and efficiency (Arya, 2025).

The landscape shows that while just 9 percent of Chief Technology Officers believe higher education is prepared for AI's rise, adoption is accelerating rapidly across all major platforms (Schroeder, 2025).

→ Key Statistics Summary

- 86% of students use AI in their studies (YellowBrick, 2024)
- 54% of students use AI weekly (YellowBrick, 2024)
- 19% of higher education institutions have formal AI policies (UNESCO, 2024)
- 42% are developing AI guidance frameworks (UNESCO, 2024)
- 90% of respondents use AI tools in professional work (UNESCO, 2024)
- 17% of USA universities use AI in admissions (Best Colleges, 2024)
- 9% of Chief Technology Officers believe higher education is prepared for AI (Educause, 2024).



Metrics of Non-negotiable Skills

The Task Force considered a range of learning models and their interpretations, as outlined in Table 1. Rather than presenting an exhaustive list of competencies, these categories are intended as a starting point for discussion.

Table 1: Categories of learning skill sets and their interpretation

CATEGORIES	INTERPRETATION
Experimental and applied learning	▫ Learning through direct experience and practical application of knowledge in real-world or simulated settings.
Collaborative and social learning	▫ Learning occurs through group interaction, shared goals, and the exchange of ideas with peers.
Technology-enhanced learning	▫ Learning supported or enriched by digital tools, platforms, or multimedia to improve engagement and outcomes.
Reflective learning	▫ Learning that involves self-examination of experiences, thoughts, and feedback to gain a deeper understanding.
Self-directed and personalized learning	▫ Learning that is initiated and managed by the learner, tailored to their individual goals, pace, and preferences.

Source: AI & Education Task Force, Center for Sustainable Development, Columbia University

What follows are different Case Studies that exemplify skills and the pedagogies context situated in different education systems. They are documents that can satisfy what Coltan Scrivner (2025) calls "Morbid Curiosity." How does a zebra or deer learn about predators? They don't have books, language, or similar ways to transmit information; their only way to learn is to be curious about it, to observe it under certain circumstances. We have culture and language to tell stories, so we can learn about AI firsthand. Case studies are our firsthand stories to learn from, as the world of knowledge and uses of AI is so complex in different education systems.

The Case Studies in the Appendix of this report provide nuanced illustrations of the complexities of navigating digital technologies and of using AI in education, and they facilitate our firsthand learning of non-negotiable skills. Education systems must continue to develop, even with the use of AI for teaching and learning.

Synopses of the Case Studies

In this section, we have included a small selection of case studies to illustrate the themes under which they are categorized. The full set of case studies is provided in the Appendix.

THEME 1: DEVELOPING SYSTEMWIDE EMOTIONAL AND COGNITIVE ABILITIES

Case Study 1. An Education of Care: Reflections from New Jersey, USA

By Radhika Iyengar

- → **Location / setting:** Middle school, suburban New Jersey, United States
- → **Education level:** Lower secondary education
- → **Primary AI issue:** How constant digital mediation can weaken social, reflective, and relational dimensions of learning

Key Skills Highlighted

NON-NEGOTIABLE HUMAN SKILLS	RELATED AI-ADJACENT SKILLS HIGHLIGHTED IN CASE STUDY 2 (SEE APPENDIX)
→ Self-awareness	→ Critical thinking
→ Self-management	→ Applied learning
→ Social awareness	→ Adaptive use of AI
→ Relationship skills	→ Prompt design
→ Responsible decision-making	
→ Civic and community engagement	
→ Well-being and mental health	

Context

This case takes place in a middle school setting in suburban New Jersey, where digital devices are deeply embedded in everyday student life. AI and digital tools are not presented as formal curriculum drivers alone, but as part of a broader educational environment in which students increasingly move through the day mediated by screens, search tools, summaries, and online content. Case Study 2 (see Appendix) complements this example by showing how a student uses AI more directly to prepare for exams and apply academic concepts.

What is happening

Sangeeta's day is structured around digital routines. She travels to school surrounded by peers who are physically present but socially disconnected, each focused on a phone. At school, much of her learning is delivered through digital platforms, and at home her assignments continue on a school-issued Chromebook. Reading, researching, and reviewing material increasingly happen through summaries, study guides, videos, search engines, and AI tools rather than through sustained engagement with texts or direct human interaction.

AI becomes part of this environment not as a dramatic intervention, but as a convenient shortcut. Instead of reading a full assigned book, Sangeeta is tempted to rely on a chapter-by-chapter summary generated online. She uses ChatGPT to check facts for social studies and moves easily between school material and digital distraction. Over the course of a full day, learning becomes more efficient, but also more mediated, fragmented, and detached from reflection, attention, and interpersonal connection.

What this case shows

This case shows that the integration of digital tools and AI into education is not only a question of efficiency or access to information. It is also a question of what may be lost when learning becomes overly screen-based and socially thin. The issue is not that digital tools are inherently harmful. Rather, the case highlights the risk that students may spend more time retrieving information and less time building the emotional, relational, and reflective capacities that education should also develop.

The case therefore points to a system-level challenge. If schools do not deliberately create space for social-emotional learning, reflection, and human interaction, these capacities may be gradually crowded out by convenience, speed, and digital dependence.

How this case led to the skill selection

These skills were selected because the case shows that students still need to regulate attention, reflect on their choices, relate to others, and make thoughtful judgments even in highly digitized learning environments. AI may help students retrieve information more quickly, but it does not replace the need for empathy, self-management, social connection, or responsible decision-making.

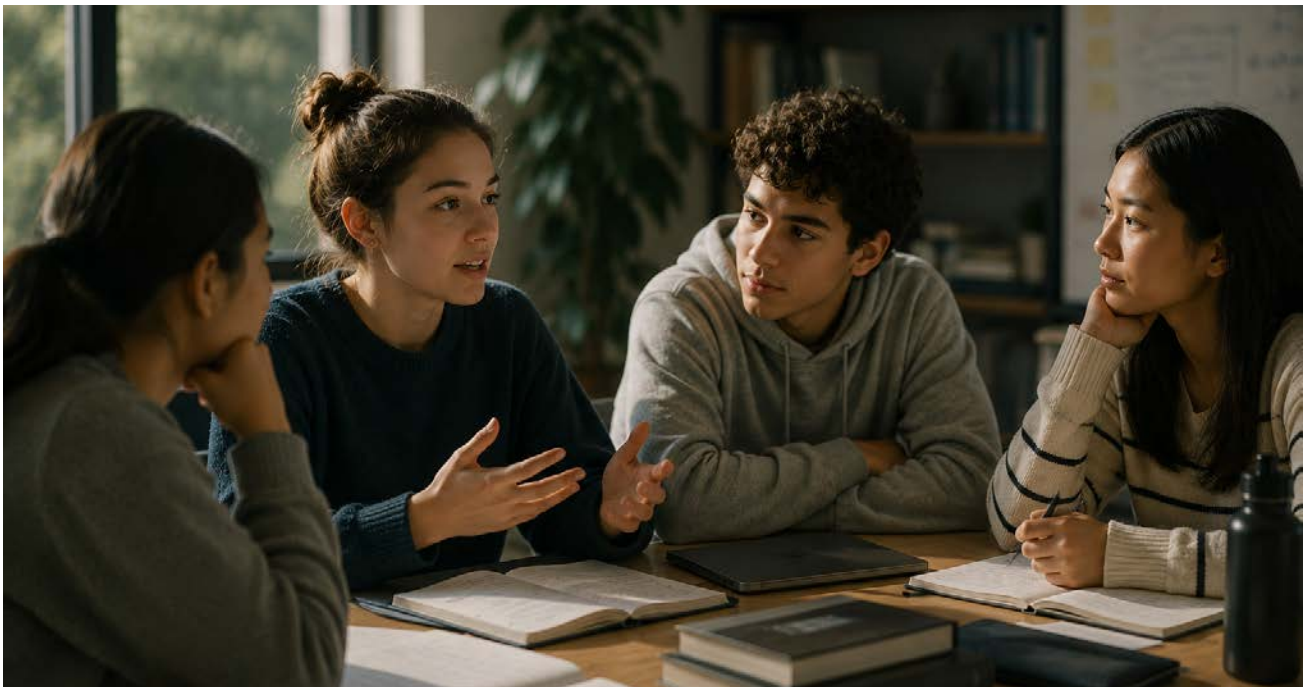
The companion case study 2 in the Appendix strengthens this point from the learner's perspective. Together, the two cases show that education systems must develop both human capacities and careful AI use. Students need to know how to work with AI, but they also need the emotional and cognitive grounding to avoid becoming overly dependent on it.

Pedagogical implication

This case points to the importance of reflective learning, social and collaborative learning, and practices that strengthen attention, judgment, and interpersonal awareness. These may include journaling, classroom discussion, structured reflection, group-based activities, and dedicated social-emotional learning. The broader lesson is that AI should be used as a support for learning, not as a substitute for reading, reflection, human connection, or the development of independent judgment.

Primary Insight

→ **This case points to the importance of reflective learning, social and collaborative learning, and practices that strengthen attention, judgment, and interpersonal awareness.**



THEME 2: INDIVIDUAL AND LIFELONG LEARNING: DIGITAL LEARNING FROM EMERGING TECHNOLOGIES

Case Study 3. Constructive Collaboration Using Digital Technology

By Esther E. Gottlieb

- **Location / setting:** Public Park, Seattle, Washington, United States
- **Education level:** Informal adolescent learning
- **Primary AI issue:** How digital tools can support collaborative, self-directed learning without replacing human interaction

Key Skills Highlighted

NON-NEGOTIABLE HUMAN SKILLS	AI-ADJACENT SKILLS
→ Collaboration and social intelligence	→ Mindful use of digital tools
→ Creative and original thinking	→ Technology-supported problem-solving
→ Persistence and self-direction	→ Self-directed learning

Context

This case takes place outside a formal classroom, but it offers an important window into how young people learn with digital tools in everyday settings. It shows that technology can support learning not only through efficiency or information retrieval, but also through collaboration, persistence, and play. Case Study 4 (see Appendix) complements this example by showing how digital tools can also support lifelong learning and green skills development in a very different context.

What is happening

Three teenage boys were observed in a neighborhood park in Seattle spending roughly two hours learning to sing a song in Spanish. Each had a smartphone, and together they used translation tools, pronunciation support, repetition, and division of parts to work through the song line by line. They moved between individual practice and group collaboration, using the digital tools available to them while also relying on one another to make progress.

What stood out was not only the technology, but the learning process itself. They stayed motivated, corrected each other, experimented, repeated difficult phrases, and turned the task into a playful, shared exercise. Whether or not it began as a school assignment, the activity became a self-directed learning experience shaped by collaboration, curiosity, and persistence.

What this case shows

This case shows that digital tools can strengthen learning when they are used to support effort, interaction, and shared problem-solving rather than replace them. The students did not simply consume an answer. They used technology to break down a challenge, make it manageable, and work through it together.

The case also offers an important counterpoint to overly narrow views of AI and digital tools. The educational value here lies not in automation, but in how technology supports human learning processes: experimentation, communication, repetition, and collaborative meaning-making. It reminds us that even in highly technologized environments, learning remains social, embodied, and effortful.

How this case led to the skill selection

These skills were selected because the case shows that technology alone did not produce the learning. What made the task successful was the learners' ability to collaborate, stay engaged, divide the work, and use digital tools purposefully. The key human contribution was not access to information, but the ability to turn that information into shared practice, understanding, and progress.

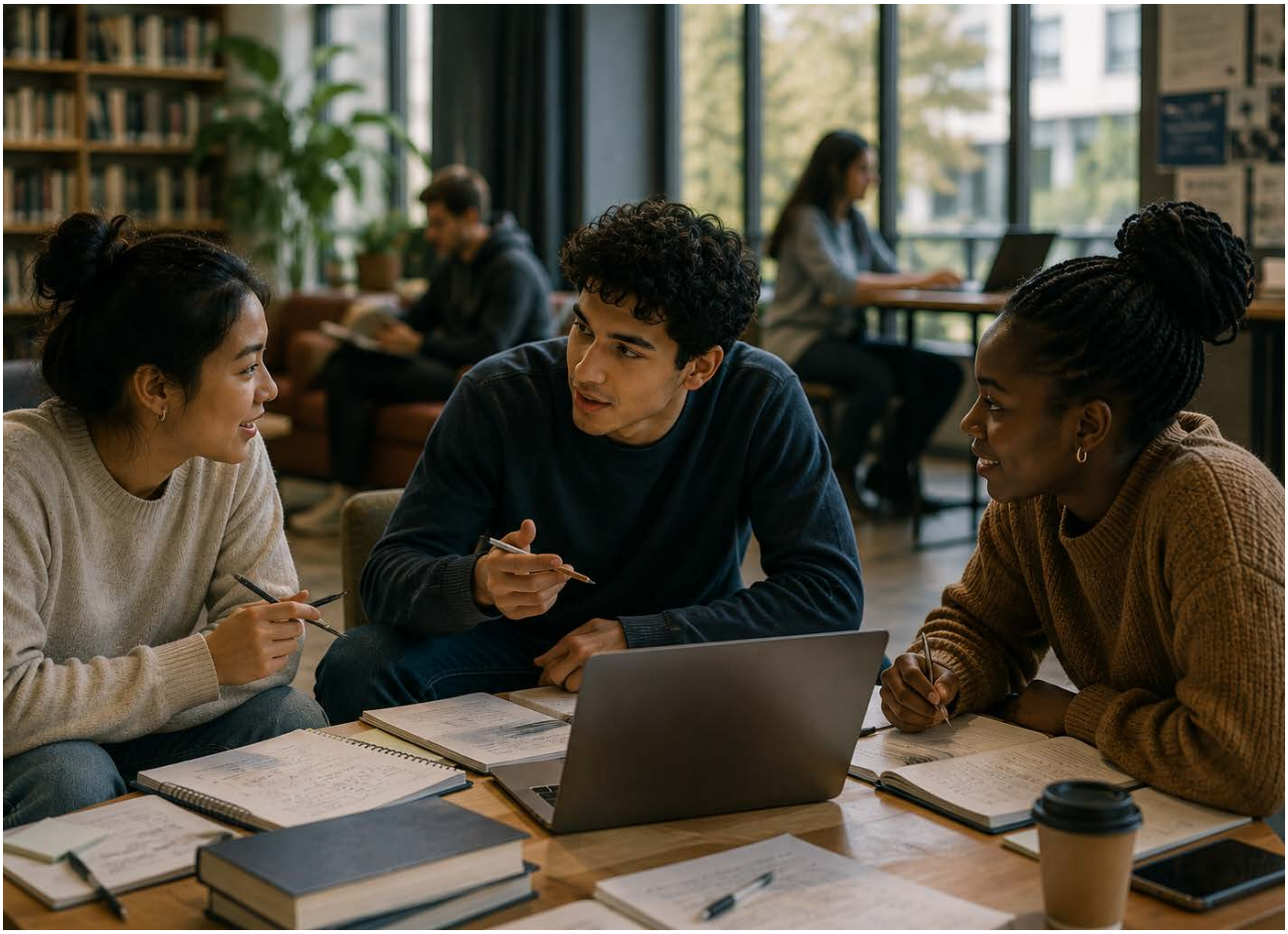
The case also highlights an important AI-related principle: digital tools are most valuable when they extend human effort rather than replace it. The students remained active learners throughout. They interpreted, repeated, corrected, and supported one another, which is why collaboration, self-direction, and mindful use of technology emerge as the central skills in this example.

Pedagogical implication

This case suggests that education systems should use digital tools to support collaborative and applied learning rather than isolate learners behind screens. Group tasks, structured peer learning, language practice, performance-based activities, and problem-solving exercises can all help students use technology in ways that preserve human interaction and shared effort. The broader lesson is that digital learning should not reduce the social dimension of education. It should strengthen it.

Primary Insight

→ **This case suggests that education systems should use digital tools to support collaborative and applied learning rather than isolate learners behind screens.**



THEME 3: TEACHING AND LEARNING USING AI

Case Study 7. Indonesia: AI Integration and Ethical Learning in an Islamic Junior High School in Yogyakarta

By Paramitta Sekartaji

- **Location / setting:** Private Islamic junior high school, Yogyakarta, Indonesia
- **Education level:** Lower secondary education
- **Primary AI issue:** How schools can integrate AI while preserving ethical judgment, independent reasoning, and reflective learning

Key Skills Highlighted

NON-NEGOTIABLE HUMAN SKILLS	AI-ADJACENT SKILLS
Critical thinking and independent reasoning	Source evaluation
Ethical judgment	Accurate citation and responsible use of information
Reflective learning	Comparing multiple viewpoints
Learner agency and responsibility	Purposeful and bounded use of AI tools

Context

Indonesia offers a useful setting for examining AI in education because its school system is highly diverse across geography, language, resources, and institutional culture. AI is being introduced in a context that includes elite urban schools, rural public schools, faith-based institutions, and schools with very different levels of digital readiness.

In 2025, Indonesia's Ministry of Primary and Secondary Education introduced a national policy to bring coding and AI into the curriculum from elementary through vocational levels. The policy promotes digital literacy, programming, data skills, and ethical awareness, and gives schools flexibility in how these topics are taught. At the same time, implementation remains uneven, especially in relation to teacher training, infrastructure, cultural adaptation, and the ethical use of generative AI.

This case focuses on a private Islamic junior high school in Yogyakarta. It offers a useful lens on how one values-driven institution is trying to approach AI not only as a technical tool, but also as a question of ethics, effort, and student formation.

What is happening

At the school, AI tools such as ChatGPT are accepted as potentially useful, but they are used within clear boundaries. Teachers allow students to use AI for brainstorming, clarification, or initial exploration of ideas, but they discourage its use as a shortcut for completing assignments. Students are expected to treat AI as a learning aid, not as a substitute for thinking.

This approach is shaped by both educational concerns and religious values. School leaders worry that uncritical AI use may weaken academic integrity, reduce effort, and erode independent reasoning. In response, the school emphasizes forms of digital literacy that go beyond prompt-writing or technical fluency. Students are encouraged to evaluate sources, cite accurately, compare multiple viewpoints, and reason independently before accepting AI-generated information as valid.

This school-level practice also sits within a broader national tension. AI policy in Indonesia is moving forward, but implementation remains uneven. In some settings, AI is being used to support personalized learning, translation, and classroom efficiency. In others, there are unresolved concerns about access, teacher readiness, academic integrity, and how to teach AI in ways that remain ethically grounded.

What this case shows

This case shows that effective AI integration is not only about access to tools or technical capacity. It is also about the values that shape how those tools are used. In this school, AI is framed as something that must remain subordinate to effort, judgment, and responsibility. That makes the case especially useful for this report, because it shows how AI literacy can be understood not only as a technical skill set, but as a form of ethical and educational practice.

The case also highlights a broader policy challenge. National AI strategies may set ambitious goals, but if they do not provide clear guidance on pedagogy, ethics, and implementation, schools are left to define these boundaries on their own. This creates uneven outcomes and raises the risk that "AI literacy" will be reduced to technical competence without enough attention to reflection, critical thinking, or moral judgment.

How this case led to the skill selection

These skills were selected because the case shows that the central challenge is not whether students can access AI, but whether they can use it without weakening their own judgment. The school's approach makes clear that learners still need to question sources, think independently, and exercise responsibility even when AI tools are readily available.

The case also highlights the importance of AI-adjacent skills that support responsible use. Students must know how to verify information, assess credibility, and compare outputs rather than accept AI-generated responses at face value. In this sense, the case points to a clear boundary: AI may support learning, but it cannot replace the human capacities needed to guide, interpret, and evaluate that learning.

Pedagogical implication

This case suggests that schools should teach AI through structured boundaries, not open-ended adoption. Educators should create learning tasks that require students to justify their reasoning, evaluate sources, compare interpretations, and reflect on when AI is useful and when it is not. More broadly, AI literacy should be taught as both a technical and ethical practice. The lesson from this case is that students need more than access to AI. They need the judgment to use it well.

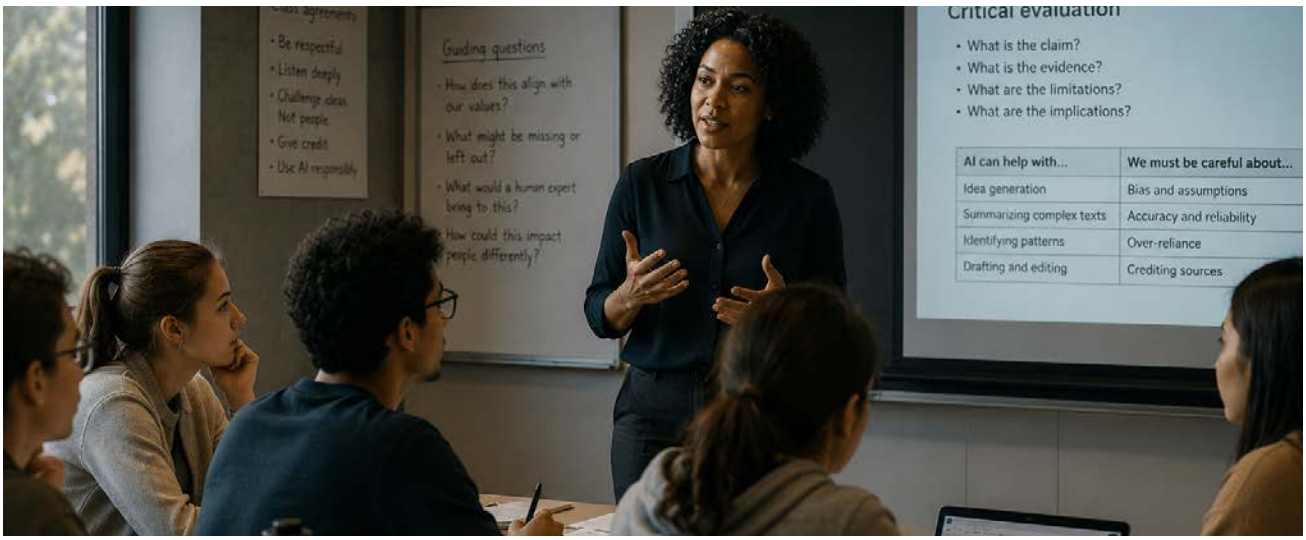
Open questions

- How consistently can these values be applied across different classrooms and subjects?
- Do students internalize these norms, or do they revert to shortcuts when unsupervised?
- Can faith-based educational frameworks help shape distinctive and constructive approaches to AI ethics in education?

Related themes also appear in Case Studies 5 and 6 (see Appendix), which further examine how AI use in climate education and higher education raises similar questions about reflection, agency, and the boundaries of responsible AI use.

Primary Insight

→ **This case suggests that schools should teach AI through structured boundaries, not open-ended adoption.**



THEME 4: AI WITH ILLUSTRATIONS OF STUDENTS USING AI

Case Study 9. Highly Creative Work: How a Professional Uses AI

By Esther E. Gottlieb

- **Location / setting:** Professional creative and technical work, United States
- **Education level:** Higher education to advanced professional practice
- **Primary AI issue:** What AI can and cannot do when used by a highly skilled professional with deep subject-matter expertise

Key Skills Highlighted

NON-NEGOTIABLE HUMAN SKILLS	AI-ADJACENT SKILLS
Creative and original thinking	Process optimization
Critical judgment	Strategic delegation
Deep subject-matter expertise	Evaluation of AI outputs
Writing as a mode of thinking	Effective prompting and feedback
Problem-solving in context	Human oversight in technical work

Context

This case examines how a highly trained creative professional uses AI in advanced technical and artistic work. It is especially valuable because it shows AI not in the hands of a novice, but in the hands of someone who already possesses many of the non-negotiable skills this report identifies as essential.

The subject of this case, referred to here as H., has advanced training in computer science, art, digital media, and game design. His work spans programming, design, writing, simulation, and creative production. This makes the case particularly useful for understanding the relationship between expertise and AI use: what AI can accelerate, what it can support, and what still depends on human judgment, creativity, and experience.

What is happening

H. uses AI as a tool for comparison, iteration, and efficiency. He tests different AI systems to see how they approach the problems he is working on. He uses AI to save time on programming, but only because he already understands the underlying code well enough to judge whether the output is useful and to correct it when needed. He also uses AI to compare styles in writing, explore variants, and generate alternative directions for a project.

A central theme in this case is delegation. AI is most useful to H. when the task, the goal, and the expected output are clearly defined. In this context, prompting is less about clever wording and more about structured delegation. The better the instructions, the easier it becomes to evaluate whether the output is acceptable. This makes AI highly useful for speed and iteration, but only when guided by strong human expertise.

At the same time, H.'s practice shows the limits of AI. He does not outsource the core intellectual and creative work of writing. For him, writing is not only a product; it is a process through which ideas are clarified, tested, and made meaningful. In programming as well, AI may generate code quickly, but it still struggles with deeper reasoning, debugging, and contextual understanding in complex systems.

What this case shows

This case shows that AI is most powerful when it augments expertise rather than substitutes for it. The professional value of AI in this example comes from speed, comparison, and iteration. But those advantages depend on the user already possessing judgment, technical understanding, and the ability to recognize when AI is wrong.

The case therefore illustrates a broader lesson for education and the future of work. As AI becomes more capable, the real premium may shift away from routine production and toward higher-order capacities: evaluating outputs, setting goals, detecting errors, and making informed decisions about what to delegate. AI can help professionals move faster, but it does not eliminate the need for deep knowledge or the cognitive work required to produce original and context-sensitive results.

How this case led to the skill selection

These skills were selected because the case makes clear that AI is only useful here when guided by a person who already knows what good work looks like. H. can benefit from AI because he can evaluate, refine, reject, and correct what it produces. The central human capacity in this case is not speed, but judgment.

The case also shows that some of the most important professional skills become even more valuable in an AI-rich environment. Writing remains essential because it supports reflection and originality. Technical expertise remains essential because AI-generated code still requires supervision and correction. In both cases, AI supports the work, but the human remains responsible for quality, meaning, and direction.

Pedagogical implication

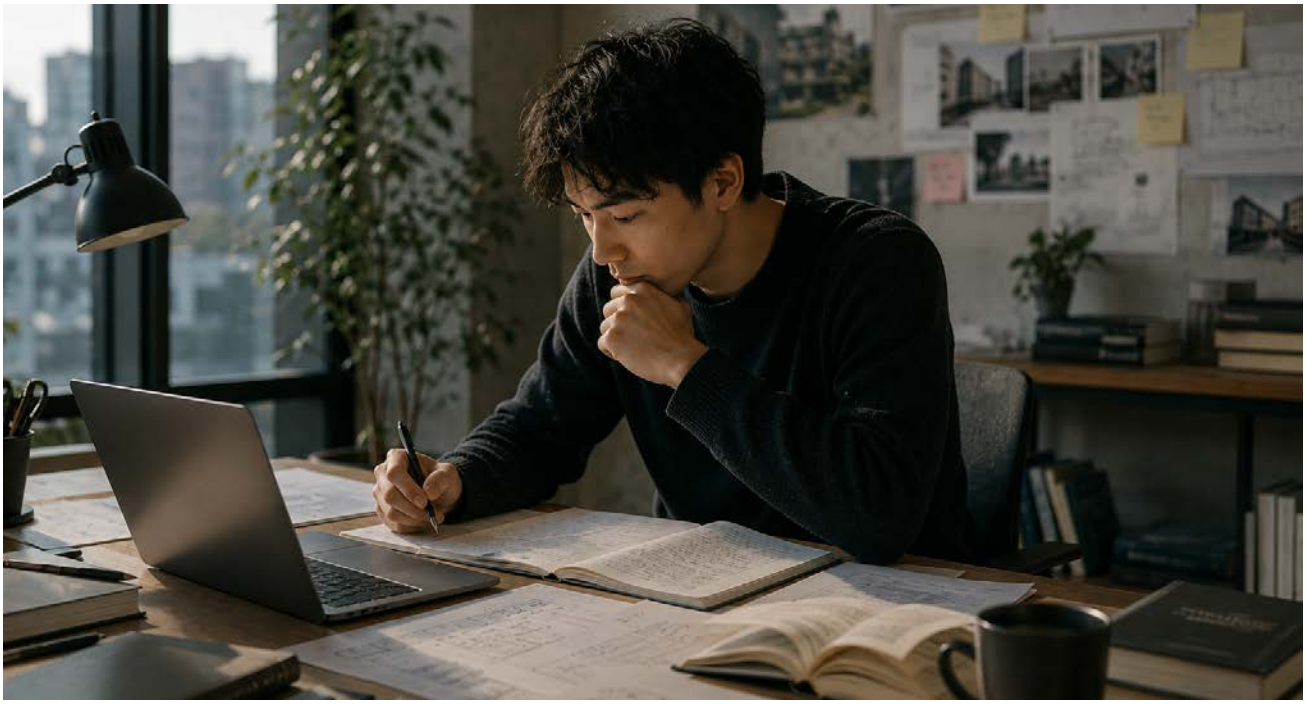
This case suggests that education should not treat AI fluency as a substitute for foundational expertise. Students still need to learn how to write, reason, code, and evaluate quality on their own before they can use AI well in advanced work. Educators should design assignments that require students to compare AI-generated and human-generated outputs, justify why one is stronger than another, and reflect on what should and should not be delegated to AI. The broader lesson is that AI works best when learners first develop the judgment needed to supervise it.

Link to related case

Case Study 8 (see Appendix) complements this example by showing how students use AI in career preparation and academic work. Together, the two cases illustrate a shared point: AI can enhance learning and productivity, but only when it supports rather than replaces independent thought, analysis, and professional judgment.

Primary Insight

→ **This case suggests that education should not treat AI fluency as a substitute for foundational expertise.**



THEME 5: RECONCEPTUALIZING HIGHER EDUCATION AND WORK: COUNTRY REPORTS

Case Study 11. Kenya: Undergraduate Students' Interaction with an Ethical AI-Supported Academic Writing Tool

By John Otieno Oredo

- **Location / setting:** University of Nairobi, Kenya
- **Education level:** Undergraduate higher education
- **Primary AI issue:** How AI writing tools can support student learning without replacing judgment, writing ability, and academic integrity

Key Skills Highlighted

NON-NEGOTIABLE HUMAN SKILLS	AI-ADJACENT SKILLS
→ Critical thinking and judgment	→ Information and data literacy
→ Communication and academic writing	→ Responsible use of AI-supported feedback
→ Ethical reasoning and academic integrity	→ Revision and evaluation of AI outputs
→ Creativity and original thought	
→ Metacognitive and self-regulated learning	

Context

This case is based on a pilot study conducted in the Faculty of Arts and Social Sciences at the University of Nairobi, Kenya's largest faculty. The faculty serves undergraduate students from diverse socioeconomic backgrounds and across a wide range of disciplines. Many of these students are expected to read critically and produce academic essays, yet academic writing remains a persistent challenge. Students often struggle with coherence, argumentation, structure, citation, and language use, while large class sizes and limited staff capacity make it difficult to provide individualized feedback at scale.

In response, the faculty piloted an ethical AI-supported academic writing tool over two semesters, from September 2024 to April 2025. Around 150 students voluntarily joined the platform and used it regularly to receive feedback on their essays.

What is happening

The pilot introduced AI as a support tool in a context where traditional writing feedback was limited by time and resources. Students used the platform to improve drafts, receive guidance on writing issues, and revise more independently than would otherwise have been possible.

The tool helped address a practical institutional problem: how to expand support for students' writing when lecturer-to-student ratios make regular feedback difficult. But the case also made clear that AI could not do the essential intellectual work on behalf of the learner. Students still had to decide which feedback to accept, how to strengthen an argument, how to use evidence responsibly, and how to ensure that the final submission remained their own.

What this case shows

This case shows that AI can play a constructive role in strengthening academic writing, especially where institutions face resource constraints and students need more feedback than faculty can realistically provide. However, it also makes clear that writing remains a fundamentally human process. AI may support revision, but it cannot replace the reasoning, judgment, ethical responsibility, and originality that strong academic writing requires.

The case is therefore valuable not because it demonstrates what AI can do alone, but because it clarifies the boundary between assistance and substitution. AI can help students improve drafts, but it cannot decide what counts as a strong argument, what evidence should be trusted, or what intellectual position a student should take. Those remain human responsibilities.

How this case led to the skill selection

These skills were selected because the case shows that students still need to do the core intellectual work even when AI is available. They must decide whether feedback is accurate, determine how to revise an argument, evaluate sources, and ensure that the final work remains their own. In other words, AI may assist the writing process, but it cannot replace the human capacities that make academic writing meaningful and credible.

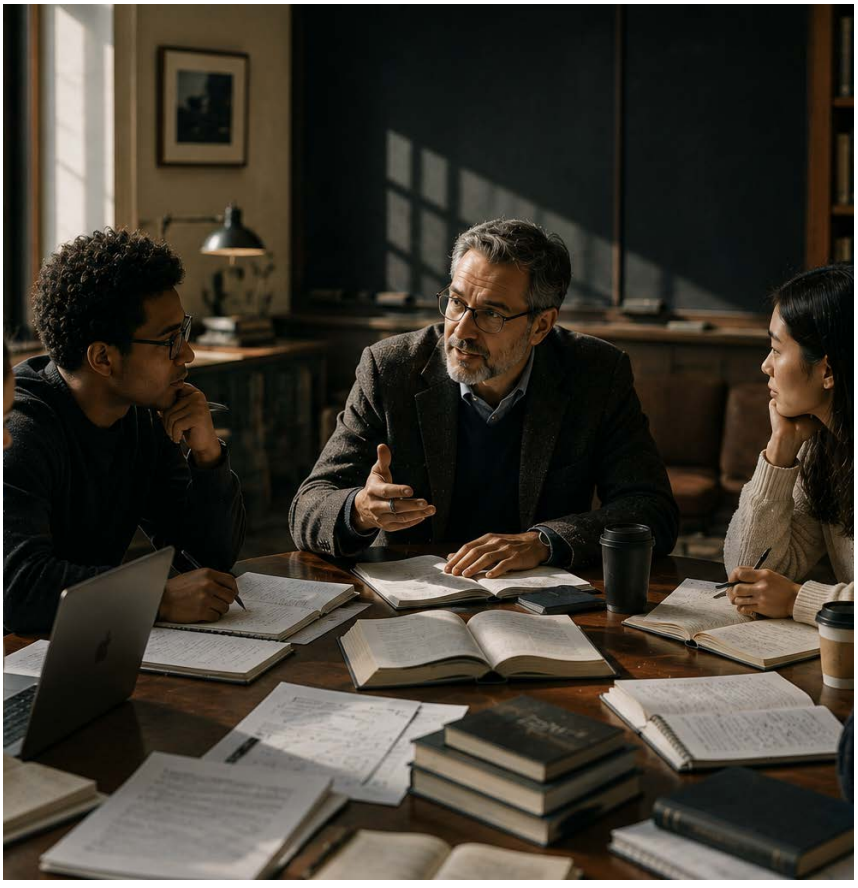
The case also highlights the importance of AI-adjacent skills. Students need enough information and data literacy to assess source quality, apply citation correctly, and use AI feedback responsibly. This means that effective AI use in writing depends not only on access to tools, but on the development of judgment, reflection, and ethical awareness.

Pedagogical implication

This case suggests that universities should use AI writing tools to extend feedback, not to lower expectations for writing. Educators should continue to teach students how to build arguments, assess evidence, revise thoughtfully, and reflect on their own writing process. AI can support these goals, especially in large classes, but it should be integrated in ways that reinforce rather than weaken intellectual ownership. Useful pedagogical responses include reflective writing notes, revision memos, peer feedback, source evaluation exercises, and assignments that require students to explain how they used AI and why.

Link to related cases

Related themes appear in Case Study 10 (see Appendix), which examines how AI reshapes judgment and agency across educational levels in Greece, and in Case Study 12 (see Appendix), which highlights the importance of teacher training, critical mediation, and equitable implementation in Brazilian high schools. Taken together, these cases reinforce a common message: the educational value of AI depends less on the tool itself than on the human capacities and pedagogical structures that shape its use.



Primary Insight

→ This case suggests that universities should use AI writing tools to extend feedback, not to lower expectations for writing.

THEME 6: AI FOR PERSONAL USE

Case Study 13. AI as a Personal and Social Comfort Tool

By Haein Shin

- **Location / setting:** Personal care and healthcare contexts
- **Education level / relevance:** Cross-cutting case with implications for education, ethics, and human development
- **Primary AI issue:** How AI used for companionship, care, and emotional support can either complement or weaken human relationships and responsibility

Key Skills Highlighted

NON-NEGOTIABLE HUMAN SKILLS	AI-ADJACENT SKILLS
→ Deep empathy and human connection	→ AI literacy
→ Ethical reasoning	→ Critical evaluation of AI's role in sensitive settings
→ Self-awareness and reflection	→ Understanding the limits of automation in care
→ Responsibility in human-centered care	

Context

This case moves beyond the classroom to examine AI in personal and social care settings. It is relevant to education because it raises a broader question that also applies to learning: when AI begins to mediate care, comfort, and emotional support, what human capacities must remain protected?

The case focuses on AI tools used in contexts such as eldercare and healthcare, where systems may support users through reminders, interaction, note-taking, or other forms of assistance. These tools are often presented as practical responses to labor shortages, rising costs, or overstretched care systems. At the same time, they raise deeper questions about what should remain fundamentally human.

What is happening

In care settings, AI can take on specific tasks that were once performed only by people. It can remind patients to take medication, help organize records, assist with notetaking, and support communication or monitoring. In some settings, AI-enabled devices or robots are used to supplement caregiving for older adults, creating new forms of interaction that combine digital and human care.

This does not necessarily mean that AI fully replaces caregivers. In many cases, it redistributes tasks and changes how care is delivered. Some functions become more efficient, some become more remote, and some remain deeply dependent on human presence. The result is not a simple substitution, but a reorganization of care.

What this case shows

This case shows that AI in care settings is not only a technical issue. It is a human one. The key question is not whether AI can perform certain tasks, but how its use changes relationships, responsibility, and the meaning of care itself.

Used well, AI can support overstretched systems, reduce administrative burdens, and make it easier for professionals to focus on the parts of care that most require human attention. Used poorly, it can weaken empathy, normalize emotional substitution, and reduce care to a set of transactional functions. That is why this case matters for education as well. It reminds us that when AI becomes embedded in emotionally significant areas of life, technical functionality is never enough. Human judgment, empathy, and responsibility remain essential.

How this case led to the skill selection

These skills were selected because the case shows that AI may support care, but it cannot replace the human capacities that make care meaningful. Tasks such as note-taking, reminders, and administrative support can be delegated, but empathy, moral judgment, and emotional presence cannot simply be automated without changing the nature of the interaction itself.

The case also highlights the importance of AI-adjacent skills, especially AI literacy. Learners, educators, and future professionals need to understand not only what AI can do, but what it should and should not be used for in emotionally sensitive contexts. The real challenge is not technical adoption alone, but maintaining clarity about the boundaries between support, substitution, and dependence.

Pedagogical implication

This case suggests that education should prepare learners to think carefully about AI in human-centered professions and personal settings. Relevant pedagogical approaches include reflective learning, journaling, experiential learning, discussion-based ethics exercises, self-assessment, and activities that strengthen emotional awareness and human connection. The broader lesson is that AI literacy must include not only technical understanding, but also reflection on dignity, care, and what should remain irreducibly human.

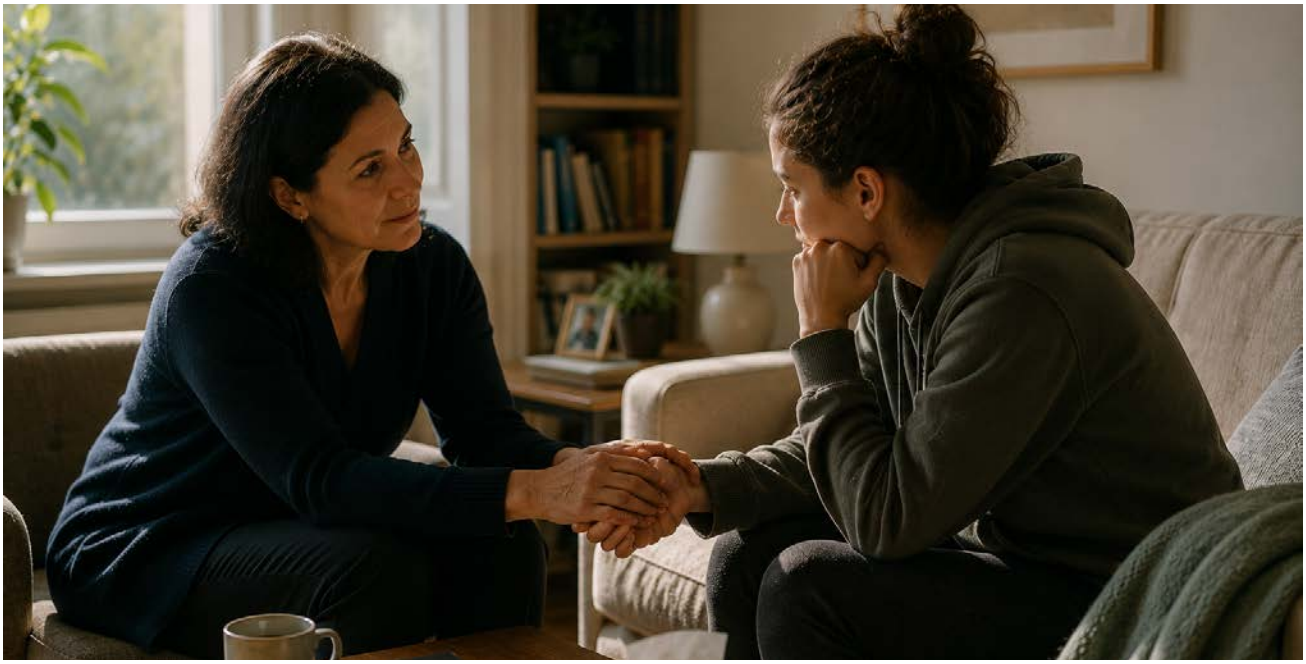
Link to related cases

This case complements the broader report by showing that the challenge of AI is not limited to classrooms or workplaces. The same questions raised in education—about judgment, dependence, responsibility, and what should remain human—also appear in healthcare and personal care settings. In that sense, the case reinforces the report's central argument: AI may support human systems, but it should not replace the human capacities those systems are meant to serve.

Across these case studies, a common pattern emerges: AI can enhance learning, access, and efficiency, but its educational value depends on the human skills and pedagogical structures that guide its use. Table 2 (see appendix) brings these findings together by summarizing the non-negotiable human skills and AI-adjacent skills identified across contexts, along with their pedagogical alignment and relevance for learning in the age of AI.

Primary Insight

→ **This case suggests that education should prepare learners to think carefully about AI in human-centered professions and personal settings.**



Concluding Remarks

The implications of this framework are clear: as AI becomes more embedded in education, systems will need to be far more intentional about what they are trying to protect, develop, and assess. Across different countries, educational settings, and stages of learning, the evidence consistently shows that AI can support learning, expand access to information, and improve efficiency. But it also shows that education systems must be far more deliberate about protecting the human skills that AI cannot replace.

These non-negotiable human skills include critical thinking, ethical judgment, empathy, creativity, collaboration, self-awareness, and the capacity for reflection. They are the foundations of meaningful learning, responsible citizenship, and effective work in an AI-rich world. Alongside them, learners and educators also need AI-adjacent skills: the ability to evaluate AI outputs, use prompts purposefully, assess sources, understand data, and decide when AI should support a task and when human judgment must lead.

The case studies also show that these skills do not develop automatically. They must be cultivated through intentional pedagogy. Education systems therefore need to create learning environments that strengthen reflection, dialogue, writing, collaboration, problem-solving, and ethical reasoning. Approaches such as reflective journaling, peer feedback, social-emotional learning, group discussion, active listening, role-playing, problem-based learning, and structured debate can all help learners build the capacities they will need to work with AI without becoming dependent on it.

A central lesson of this report is that efficiency cannot become the main organizing principle of education. AI may help students write faster, summarize more quickly, and retrieve information instantly. But speed is not the same as learning, and information is not the same as understanding. The more powerful AI becomes, the more important it is to preserve the practices that build interpretation, judgment, originality, and depth of thought.

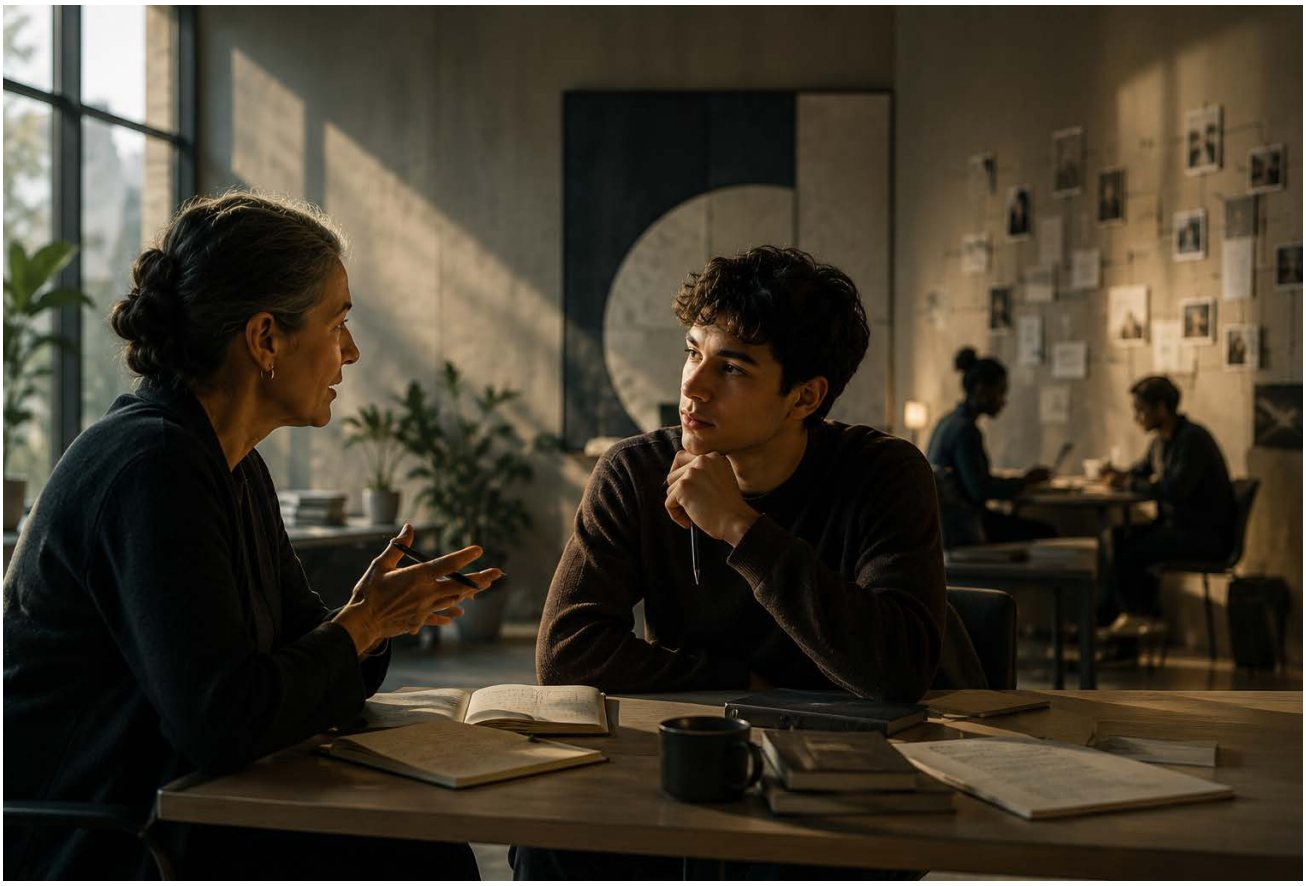
This is especially important in relation to writing, reading, and reflection. Research continues to show that human cognition develops through effortful processes that AI can support but should not replace. The challenge for education is therefore not to resist technology altogether, but to ensure that students continue to read carefully, write independently, think critically, and engage with complexity even as AI tools become more capable and more available.

The same principle applies beyond the classroom. As AI reshapes the world of work, the premium on routine production may decline, but the value of judgment, adaptability, creativity, and ethical responsibility will rise. Education systems must respond now by preparing learners not only to use AI effectively, but also to remain fully human in environments increasingly shaped by algorithms. That means building people who can question, decide, collaborate, imagine, and take responsibility, not simply people who can operate tools.

Ultimately, this report argues for a human-centered approach to AI in education. AI should help expand human potential, not narrow it. It should support teachers, not sideline them; strengthen learners, not make them passive; and improve systems without eroding the relationships, values, and forms of thought that education exists to develop. The question is no longer whether AI will be part of education. It already is. The real question is whether education systems will use this moment to strengthen the human capacities that no future of learning can afford to lose.

AI & the world of labor and the future of work

The future of work in the age of AI for many is imperiled. A recent Gallup poll found that 75% of U.S. adults believe AI will lead to fewer jobs. Due to plummeting birth rates and a cratering labor force, a comparable labor shortage is unfolding across the industrialized world. This is not just a prediction, but well on its way to becoming reality. Humans who will turn thirty in the year 2053 have already been born. Barring a massive change in immigration policy, the U.S. and other rich countries will run out of workers before we run out of jobs (Varian, 2020). The projection for the United States and even China is that there will be insufficient workers by 2030 to 2032.[3]



David Autoe (2024) writes that AI offers a unique opportunity for the labor market to extend the relevance, reach, and value of human expertise. This MIT research found that AI's capacity to weave information and rules with acquired experience to support decision-making can be applied to enable a larger set of workers possessing complementary knowledge to perform some of the higher-stakes decision-making tasks that are currently arrogated to elite experts, such as medical care to doctors, document production to lawyers, software coding to computer engineers, and undergraduate education to professors. Autoe's thesis is an argument about what is possible: "AI, if used well, can assist with restoring the middle-skill, middle-class heart of the US labor market that has been hollowed out by automation and globalization."

AI poses a real risk to labor markets, but not that of a technologically jobless future. The risk is the devaluation of expertise. A future where humans supply only generic, undifferentiated labor is one where no one is an expert because everyone with AI "is an expert."

The opportunity that AI offers is to extend the relevance, reach, and value of human expertise for a larger set of workers. Until now, gaining expertise has taken years of working. With AI, it is possible to accelerate the acquisition of professional expertise. Not only could this dampen earnings inequality and lower the costs of key services like healthcare and education, but it could also help restore the quality, stature, and agency that have been lost to too many workers and jobs eroded over the past four decades as computerization has marched onward and inequality has grown more prevalent. Adaptation is key.

The challenge is not just changing the world of work, but the speed of change; humans adapt slowly, while AI moves digitally and rapidly, potentially leaving us behind. As our report shows, non-negotiable skills are those that AI can't easily replicate; emotional intelligence, creativity, and complex critical thinking will become crucial, requiring massive, continuous retraining (Harari, 2025b). To equip graduates for a changing world, education must value both technical knowledge and soft skills.

Summary

The case studies in this report point to a clear conclusion: in the age of AI, education and the future of work will depend on a stronger focus on the human capabilities that technology cannot replace. These include critical thinking, creativity, emotional intelligence, ethical judgment, reflection, and strong writing and communication skills. Alongside them, learners and educators will also need AI-adjacent skills such as AI literacy, discernment, data fluency, and the ability to use AI tools purposefully and responsibly.

The central challenge is not whether AI will be used. It already is. The real challenge is how it is used, and whether education systems can integrate it in ways that strengthen human agency rather than weaken it. As routine tasks become easier to automate, the value of judgment, originality, complex problem-solving, and thoughtful collaboration will only increase. This is why education systems must move quickly, but carefully. Teachers, institutions, and policymakers need safeguards, pedagogical strategies, and practical guidance that help maximize the benefits of AI while reducing its risks. This includes teaching students how to identify misinformation, question biased or overly agreeable AI responses and maintain human oversight over AI-supported learning.

AI is more adaptable and more widely applicable than most previous technologies. That gives it enormous promise but also makes its risks broader and more difficult to contain. How AI is deployed, and who benefits from it, will depend on choices made by governments, educational institutions, technology companies, civil society, and users themselves. For education leaders, the message is clear: AI should not be adopted simply because it is available. It should be introduced in ways that are transparent, accountable, and aligned with educational purpose.

This report also underscores that there are no shortcuts in human development. Education is not only about producing faster outputs. It is about forming people who can think independently, act ethically, work with others, and make sense of a changing world. AI can support that process, but it cannot replace it. The more responsibility we give to AI in education and daily life, the more important it becomes to preserve the distinctly human capacities that learning is meant to build.

Finally, the report stresses that the digital divide is rapidly becoming an AI divide. Without electricity, connectivity, affordable devices, and context-appropriate infrastructure, millions of learners will be excluded from the benefits of these technologies. Safety, equity, and cultural relevance must therefore remain central. If AI systems do not reflect the diversity of languages, communities, and lived realities they are meant to serve, they will deepen existing inequalities rather than reduce them. The framework offered in this report is intended as a starting point for educators, institutions, and policymakers to identify the non-negotiable skills most important in their own context and to design pedagogical approaches that ensure AI remains a tool in service of human development.

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References

1. Agyemang, S. Tibbitts,T. and Sage P (2024) AI Human Rights Literacy. Current Issues in Comparative Education(CICE), 26 (2), https://doi.org/10.52214/cice.v26i2.13139

2. Anthropic. (2024). Introducing Claude for Education. Retrieved from https://www.anthropic.com/news/claude-for-education

3. Arendt, H. (1998). *The human condition* (2nd ed.). University of Chicago Press. (Original work published 1958).

4. Arya, Aastha (2025). How AI Technology Is Transforming Higher Education in Universities. Retrieved from https://goedmo.com/blog/ai-in-universities/

5. Autoe, David (2024.) *Applying AI to Rebuild Middle Class Jobs*. NBER Working Paper No. 32140 JEL No. J01, J2, N30, O14 https://noemamag.com/how-ai-could-help-rebuild-the-middle-class/

6. Bar-Gil, O. (2025). The Google self as digital human twin: implications for agency, memory, and identity. *AI & Society* https://doi.org/10.1007/s00146-025-02692-1

7. Beckett, K. (2017). John Dewey's conception of education: Finding common ground with R. S. Peters and Paulo Freire. *Educational Philosophy and Theory*, 50(4), 380–389. https://doi.org/10.1080/00131857.2017.1365705

8. Best Colleges. (2024). AI in college admissions: How universities are using artificial intelligence. Retrieved from https://www.bestcolleges.com/research/ai-in-college-admissions/

9. Biesta, G. J. J. (2010). *Good education in an age of measurement: Ethics, politics, democracy.* Routledge. https://doi.org/10.4324/9781315634319

10. Burns, Mary, Rebecca Winthrop, Natasha Luther, Emma Venetis and Rida Karim (2016). *A New Direction for Students in An Ai World: Prosper, Prepare, Protect*. Washington DC.: Brookings Institution, center for universal education.

11. Campbell Academic Technology Services (2024). AI in Higher Education: A Meta Summary of Recent Surveys of Students and Faculty. Retrieved from Campbell.edu

12. CASTELLO, Graziela; BRANDÃO, Rodrigo; VIEIRA, Priscila; PICANÇO, Monise; RIBEIRO, Florbela. Competências e usos da Inteligência Artificial na educação: um estudo qualitativo com alunos e professores do Ensino Médio no Brasil. In: NÚCLEO DE INFORMAÇÃO E COORDENAÇÃO DO PONTO BR (org.). Inteligência artificial na educação: usos, oportunidades e riscos no cenário brasileiro [livro eletrônico]. 1. ed. São Paulo: Núcleo de Informação e Coordenação do Ponto BR, 2025. p. 153–210. (Cadernos NIC.br. Estudos Setoriais). Disponível em: <https://cetic.br/media/docs/publicacoes/7/pt/20251124074142/estudos_setoriais-ia_na_educacao.pdf>. Accessed: 12 jan. 2026.

13. Chiang, T (2010), The Lifecycle of Software Objects, Burton: Subterranean Press.

14. Chronicle of Higher Education. (2024). AI adoption in higher education: Current trends and institutional responses.

15. Chazkel, Violet (April 17, 2024) "Navigating the AI Era with Durable Skills in Education" https://americasucceeds.org/author/violet

16. Ciccoricco, D. (2012). "Digital fiction: Networked Narratives" in J. Bray, A. Gibbons, B. McHale(eds.) The Routledge Companion to Experimental Literature. London & NY: Routledge.

17. Ciccoricco D. (2025) "Screenshots from the Literary Apocalypse" University of Otago, Inaugural Professorial Lecture (27 November 2025) University of Otago, New-Zealand. YouTube link to the lecture: https://youtu.be/sSGRnVxfHNc

18. Dewitte, P. (2024). *Better alone than in bad company: Addressing the risks of companion chatbots through data protection by design.* Computer Law & Security Review, 54, 106019. https://doi.org/10.1016/j.clsr.2024.106019

19. Dewey, J. (2024). *Democracy and education.* Columbia University Press. (Original work published 1916)

20. Ed Tech Connect (2025). AI in Higher Education 2025: Complete Guide to Choosing the Right LLM Platform for Your University. Retrieved from edtechconnect.com

21. Educause Review. (2024). Technology leaders say higher ed isn't ready for AI. Retrieved from https://er.educause.edu/

22. Elliott, Mark S. (2025). AI-powered innovation, learning, and technology. Transformational strategies for growth grounded in research. Retrieved from Innovation, Learning & Technology, https://www.markselliott.com/

23. FII Institute. (2026). *AI and ethics of smart education* (in collaboration with the Center for Sustainable Development, Columbia University). FII Institute. https://fii-institute.org/publication/ai-and-ethics-of-smart-education/

24. Fleming, T. (2022). Mezirow's theory of transformative learning and Freire's pedagogy: Theories in dialogue. *Adult Education Critical Issues*, 2(2), 7–19. https://doi.org/10.12681/haea.32302q34564321

25. Freire, P. (1970). *Pedagogy of the oppressed.* Seabury Press.

26. Ghosal, T. (2024) "Towards narrative AI studies" in Will Slocombe & Genevieve Liveley (eds.), *The Routledge Handbook of AI and Literature*. London & NY: Routledge

27. Gottlieb E.E. and Iyengar R. (2026) *Comparative and International Education: An Introduction*. London: Bloomsbury

28. Gottlieb, E. E. and LaBelle, T. J. (1990) Ethnographic Contextualization of Freire's Discourse: Consciousness-raising, Theory and Practice. *Anthropology & Education Quarterly* 21 (1): 3–18, 1990.

29. Harari, Y. N. (2025a) AI and Human Evolution: Recorded, June, as part of the WSJ's CEO Council in London. https://www.youtube.com/watch?v=jt3Ul3rPXaE

30. Harari, Y. N. (2025b). Interview at the Big Bang AI Festival in Berlin, September 12. https://bigbangfestival.de/en/ and Haraway Donna, J. (1991) Simians, Cyborgs, and Women: The Reinvention of Nature, New York: Routledge

31. Hassan, Y. (2023) Governing algorithms from the South: A case study of AI development in Africa. *AI & Society* 38 (4): 1429–1442. https://doi.org/10.1007/s00146-022-01527-7

32. Hayot, E & Seybold, M (2025). The 'Crisis of the Humanities' Is Over. That's Not a Good Thing.

33. All of higher ed now suffers the attacks of politics and technology. The Chronical of Higher Education (December 29) https://www.chronicle.com/article/the-crisis-of-the-humanities-is-over-thats-not-a-good-thing

34. Kennedy, B, Eileen Yam, Emma Kikuchi, et al. (2025), *How Americans View AI and Its Impact on People and Society.* Pew Research Center, www.pewresearch.org

35. Kaplan, D. M. (Ed.). (2009). *Readings in the philosophy of technology*. Rowman & Littlefield Publishers.

36. Kobran, Shannon (2025). Education must get soft to better prepare students for work. *Times Higher Education* (June 13) Retrieved from https://www.timeshighereducation.com/author/shannon-kobran

37. Kosmyna, Nataliya, Eugene Hauptmann, Ye Tong Yuan, et. al. (2025) "Your brain on ChatGPT: Accumulation of cognitive debt when using an AL assistant for essay writing tasks." arXiv:2506.08872 V1 retrieved from https://doi.org/10.48550/arXiv.2506.08872

38. McKinsey & Company. (2024). The state of AI in education: How institutions are adapting. Retrieved from https://www.mckinsey.com/

39. Microsoft Education. (2024). Microsoft Copilot in education: Integration and adoption. Retrieved from https://educationblog.microsoft.com/

40. Mollick, Ethan (2024) *Co-Intelligence: Living and Working with AI.* N.Y.: Penguin Random House.

41. Moody, J.(2026) "December Cuts Close Out Brutal Year for Sector" *Inside Higher Education* (January 6) Retrieved from https://www.insidehighered.com/news/business/cost-cutting/2026/01/06/

42. Nyaaba, M., Wright, A., & Choi, G. L. (2024). Generative AI and power imbalances in global education: Frameworks for bias mitigation. https://doi.org/10.48550/arXiv.2406.02966

43. Open AI. (2024). ChatGPT Edu: Bringing AI to universities. Retrieved from https://openai.com/chatgpt/education/

44. Purdue University. (2024). AI chatbots in higher education: A case study. Retrieved from https://www.purdue.edu/

45. Perez-Ibanez, I. (2018). Dewey's thoughts on education and social change. *Journal of Thought*, 52 (3-4), 19–31. http://journalofthought.com/wp-content/uploads/2018/12/07perezibanez.pdf

46. Postman, N. (1985). *Amusing ourselves to death: Public discourse in the age of show business.* Viking Penguin.

47. Régis C, Denis J-L, Axente ML, Kishimoto A (eds) (2024). *Human-Centered AI: A Multidisciplinary Perspective for Policy-Makers, Auditors, and Users. Taylor & Francis.*

48. Rettberg, Jill Walker and Wigers, Hermann (2025) "AI-generated stories favour stability over change: homogeneity and cultural stereotyping in narratives generated by gpt-4o-mini." Open Research Europe 5: 202 DOI: 10.12688/openreseurope.20576.1

49. Selwyn, N. (2019) *Should Robots Replace Teachers? AI and the Future of Education.* Oxford, UK: Polity Press.

50. Shor, I., & Freire, P. (1987). *A pedagogy for liberation: Dialogues on transforming education.* Bloomsbury Academic.

51. Schroeder, Ray (2025) AI in Higher Ed Will Come Slowly, Until All of a Sudden. Inside Higher Education, December 10.

52. Scrivner, C. (2025). *Morbidly Curious: A Scientist Explains Why We Can't Look Away* N.Y.: Penguin Random House.

53. Stryker, C., & Kavlakoglu, E. (2024). *What is artificial intelligence (AI)?* IBM Think. Retrieved from https://www.ibm.com/think/topics/artificial-intelligence

54. UNESCO (2025). AI and the Future of Education: Disruptions, Dilemmas and Directions.

55. UNESCO, open access https://doi.org/10.54675/KECK126

56. UNESCO. (2024). Global survey on AI policies in higher education institutions. Paris: UNESCO. Retrieved from https://www.unesco.org/

57. United Nations Department of Economic and Social Affairs. (n.d.). *Contribution to the development of a global digital literacy skills indicator.* United Nations SDG Partnerships Platform. https://sdgs.un.org/partnerships/contribution-development-global-digital-literacy-skills-indicator

58. University of Sydney. (2024). AI integration across academic and administrative functions. Retrieved from https://www.sydney.edu.au/

59. Van der Weel F. R. and Van der Meer A. L. H (2024) Handwriting but not typewriting leads to widespread brain connectivity: a high-density EEG study with implications for the classroom. *Frontiers in Psychology* (*Educational Psychology section*) 14:1219945. Retrieved from doi: 10.3389/fpsyg.2023.1219945

60. Virginia Tech. (2024). Hybrid AI-human admissions review model. Retrieved from https://www.vt.edu/

61. Varian, Hal (2020 "Automation versus procreation (aka bots versus tots)," VoxEU Columns, March.

62. Yellow Brick (2024). Student AI usage statistics: Survey results from higher education. Retrieved from https://www.yellowbrick.co/blog/ai-statistics-students

63. Wachter, R. (2026) *A Giant Leap: How AI Is Transforming Healthcare and What That Means for Our Future*. New York, NY: Portfolio Books.

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