

From Teacher Replacement to Human–AI Complementarity: Rethinking Teaching and Personal Thinking in the Age of AI, Digital Literacy and EduTech

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Abstract

The rapid emergence of Artificial Intelligence (AI), digital literacy and Educational Technology (EduTech) is transforming the nature, processes and purposes of teaching and learning. While these technologies offer unprecedented opportunities for access to information, personalised learning, instructional efficiency and knowledge production, their growing influence also raises a fundamental educational question: should technology replace the teacher and increasingly substitute for the learner's capacity for personal thinking? This paper argues that the future of education should not be constructed around the replacement of the human teacher or the outsourcing of human thinking to intelligent technologies. Rather, it proposes a paradigm of human–AI complementarity, in which AI and EduTech function as supportive and augmentative instruments within a fundamentally human educational enterprise, as long as education remains *educere* (to lead out of ignorance) and *educare* (leading into knowledge). The paper maintains that teaching involves more than information transmission; it encompasses mentorship, formation, interpretation, moral guidance, relational engagement, contextual understanding, empathy and the cultivation of judgement. Similarly, learning is not merely the acquisition of answers but the development of curiosity, critical reflection, creativity, discernment and independent thought. Using the method of critical analysis, the researcher finds out that excessive dependence on AI may, therefore, produce technologically assisted learners who are increasingly efficient at retrieving information but progressively dependent on machines for thinking. Against this possibility, the paper calls for a pedagogical balance in which teachers remain intellectually and relationally significant while learners are empowered to use AI critically, creatively and responsibly. Digital literacy must consequently include not only the ability to operate technological tools but also the capacity to evaluate, question and ethically employ AI-generated knowledge. The paper concludes that the educational future lies neither in resisting technological innovation nor in surrendering education to technology, but in cultivating a complementary relationship in which the teacher teaches, the learner thinks, and AI assists.

Keywords

Artificial Intelligence, Human–AI Complementarity, Teacher Replacement, Personal Thinking, Digital Literacy, EduTech,

Introduction

The rapid development of Artificial Intelligence (AI), digital literacy and Educational Technology (EduTech) is fundamentally reshaping the educational landscape. Technologies that were once regarded primarily as instructional aids have increasingly become active participants in the processes of teaching, learning, assessment, information retrieval and knowledge production. Generative AI, in particular, can generate explanations, formulate questions, provide feedback, summarise texts, design learning materials and perform tasks traditionally associated with teachers and students. This development has consequently intensified an important question about the future of education: Will AI complement the teacher and learner, or gradually replace the teacher and diminish the need for personal thinking? The question is no longer merely technological; it is pedagogical, philosophical and humanistic.

The contemporary educational debate must, therefore, move beyond the assumption that technological advancement automatically constitutes educational progress. The 2023 Global Education Monitoring Report stresses that technology should serve educational purposes and complement, rather than substitute for, human interaction in education (UNESCO, 2023). This position is particularly significant in an era in which generative AI can imitate aspects of explanation, tutoring and even conversational interaction. Education, however, is not reducible to the transmission or retrieval of information. Teaching involves human judgement, interpretation, mentorship, contextual sensitivity, encouragement, moral formation and the cultivation of relationships between teachers and learners. Consequently, the technological capacity to perform particular teaching tasks should not be confused with the capacity to replace the teacher as an educator.

At the same time, the increasing availability of AI creates an equally important concern about the learner. When students use AI to generate answers, essays, arguments and solutions without engaging adequately in the intellectual processes behind them, educational performance may become detached from genuine learning. The *OECD Digital Education Outlook 2026* notes that generative AI can improve task performance without necessarily producing corresponding learning gains when cognitive tasks are simply outsourced to AI. Excessive dependence may reduce metacognitive engagement and weaken the effort through which learners transform information into understanding (OECD, 2026). The challenge, therefore, is not whether learners should use AI, but how AI can be used without surrendering the learner's responsibility to think. This paper consequently proposes human–AI complementarity as a more appropriate educational paradigm than teacher replacement or technological substitution. Complementarity implies that human and artificial intelligence possess different but potentially mutually reinforcing capacities. AI can provide speed, computational power, information access, personalised assistance and routine-task support, while teachers contribute human judgement, relational intelligence, ethical discernment, contextual understanding and pedagogical leadership. Recent OECD evidence similarly suggests that the most educationally valuable use of generative AI lies in augmenting teaching while preserving teacher agency and purposeful human involvement (OECD, 2026).

Within this framework, digital literacy must also be understood more broadly than technical competence. A digitally literate learner should not merely know how to operate AI tools but should be able to interrogate their outputs, recognise limitations, evaluate evidence, identify bias, exercise judgement and take responsibility for the knowledge produced. Thus, the future teacher is not necessarily one who competes with AI, just as the future learner is not one who competes with machines in producing answers. Rather, both must learn to work intelligently with technology while preserving the distinctly human capacities of reflection, creativity, critical thinking and responsible judgement. The central educational task, therefore, is to move from teacher replacement to human–AI complementarity, ensuring that AI remains an instrument of education rather than becoming its substitute.

Literature Review

The literature on Artificial Intelligence (AI), Digital Literacy and Educational Technology (EduTech) increasingly moves beyond the question of what technology can do in education to the more fundamental question of how technology should relate to teaching and learning. This shift is important because educational value cannot be determined by technological capability alone. It must also consider what happens to the teacher, the learner and the meaning of education when AI becomes capable of producing explanations, instructional materials, feedback and written responses. Miao and Holmes (2023), in UNESCO's *Guidance for Generative AI in Education and Research*, advocate a human-centred approach that places ethical, safe, equitable and meaningful use at the centre of generative AI in education. This establishes an important principle: AI should serve educational purposes rather than determine them.

Miao and Cukurova (2024), in the *AI Competency Framework for Teachers*, further emphasise teacher agency, ethics, pedagogy and professional judgement. Their framework presents AI not as a replacement for teachers but as part of an evolving teacher–AI–student relationship. The teacher remains responsible for pedagogical decisions and for ensuring that AI is used meaningfully and ethically. Correspondingly, Miao, Shiohira, and Lao (2024), in the *AI Competency Framework for Students*, emphasise human-centred thinking, ethical responsibility and critical judgement. Students are expected not merely to use AI but to understand, evaluate and responsibly create with it. This implies that AI literacy must go beyond prompting: the learner must remain an active intellectual subject. The OECD's *Digital Education Outlook 2026* provides an especially significant contribution. It distinguishes improved task performance from genuine learning, warning that unrestricted cognitive outsourcing may improve the quality of students' outputs without producing corresponding gains in knowledge or understanding. Generative AI can support learning when guided by sound pedagogy, but it should not replace cognitive effort, independent thinking or human relationships. The OECD consequently supports forms of AI use that augment teaching while preserving teacher agency and learner engagement.

Despite these advances, a philosophical gap remains. Existing literature has addressed teacher competencies, student competencies, ethics, cognitive offloading and responsible AI use, but it has not sufficiently theorised the deeper distinction between replacing educational tasks and replacing the human agent of education. A machine may generate a lesson, explanation or essay without thereby becoming a teacher or a thinker. Similarly, a learner's possession of an AI-generated answer does not necessarily constitute personal understanding. The present study addresses this gap by placing human–AI complementarity at the centre of the philosophy of education. It argues that teaching is fundamentally an act of human formation, while learning is fundamentally an act of personal thinking. AI therefore has an important educational role, but that role is complementary rather than substitutive. The paper consequently advances a simple but philosophically significant proposition: The teacher teaches, the learner thinks, and AI assists. Here, complementarity means that technology extends human educational capacity without surrendering human agency: the teacher remains the formator, the learner remains the thinker, and AI remains the assistant.

Conceptual Analysis of Keyterms

This has to do with clarifying the concepts underpinning teaching and learning. To properly understand contemporary teaching and learning, it is necessary to clarify the central concepts shaping their meaning and practice. This section examines Education, Artificial Intelligence (AI), Digital Literacy, Education and Educational Technology (EduTech), highlighting their distinctive roles, relationships, and implications for educational transformation.

- **Artificial Intelligence (AI):** Artificial Intelligence (AI) refers to computational systems capable of performing tasks that ordinarily require human intelligence, such as reasoning, generating content, analysing information, providing feedback and supporting decision-

making. In teaching and learning, AI functions primarily as an assistant rather than a replacement for the teacher or learner. It can help teachers prepare lessons, differentiate instruction, generate learning resources, assess students' work and identify areas requiring intervention. For learners, AI can provide personalised explanations, practice exercises, feedback and opportunities for inquiry. However, effective educational use requires critical judgement, ethical awareness and verification of AI-generated information. AI should therefore augment human teaching and intellectual development, while preserving the teacher's pedagogical authority and the learner's responsibility to think, question, create and understand.

- **Digital Literacy:** Digital literacy is the capacity to access, understand, evaluate, create and communicate information effectively through digital technologies. In teaching and learning, it extends beyond the ability to operate computers or mobile devices; it involves critical, ethical and purposeful engagement with digital information and environments. A digitally literate teacher can select appropriate digital resources, communicate through online platforms, evaluate information sources, protect digital privacy and integrate technology meaningfully into pedagogy. Similarly, digitally literate learners can search for information, distinguish credible sources from misinformation, collaborate online, create digital content and use technology responsibly. Digital literacy is therefore a foundational competence for contemporary education. It enables teachers and learners to move from merely consuming digital information to critically interpreting, producing and transforming knowledge within an increasingly digital educational environment.
- **Educational Technology (EduTech):** Educational Technology (EduTech) refers to the application of technological tools, systems and processes to improve teaching, learning, assessment and educational administration. It includes learning-management systems, interactive whiteboards, educational applications, digital textbooks, virtual classrooms, simulations, adaptive learning platforms and other technologies designed to support educational purposes. EduTech can expand access to learning, facilitate collaboration, provide multimedia experiences and enable teachers to monitor learners' progress more efficiently. Its value, however, does not lie simply in introducing technology into the classroom. Technology becomes educationally meaningful when it serves clearly defined pedagogical objectives. Thus, EduTech should remain subordinate to educational purpose and pedagogy: the teacher determines what should be taught and why, while technology provides additional means through which teaching and learning can become more accessible, interactive, personalised and effective.
- **Education:** Education as rooted in *educere* and *educare* is the intentional and continuous process of developing the intellectual, moral, social, emotional and practical capacities of the human person. It is broader than the transmission of information because it seeks to form persons who can think critically, act responsibly, relate meaningfully with others and contribute positively to society. In teaching and learning, education establishes the fundamental purpose within which AI, digital literacy and EduTech must operate. The teacher facilitates learning, guides formation and creates conditions for intellectual and personal development, while the learner actively engages in thinking, questioning, discovering and applying knowledge. Education therefore cannot be reduced to technological efficiency or information acquisition. Its ultimate concern is human formation and flourishing. Technology may transform how education is delivered, but education determines what is worth learning, why it matters and what kind of person the learner becomes.

The Educational Question in the Age of AI

Every major transformation in education eventually raises a question about what education is fundamentally for. The emergence of Artificial Intelligence (AI), particularly generative AI, therefore, presents a question deeper than whether machines can perform tasks traditionally assigned to teachers or learners. The more fundamental question is: what happens to teaching when intelligence can be technologically simulated, and what happens to learning when answers can be produced without necessarily being thought through? The issue is not simply

what AI can do, but what education ought to remain. Education has traditionally been understood as more than the transmission of information. It involves the formation of persons capable of understanding, judging, questioning, creating and acting responsibly. The teacher, accordingly, has never been merely a repository of knowledge. Teaching involves interpretation, mentorship, relational presence, contextual judgement and the formation of the learner. In the same way, learning cannot be reduced to obtaining correct answers; it involves the intellectual activity through which the learner develops understanding and becomes capable of thinking independently. The arrival of AI unsettles both assumptions because machines can now generate explanations, answers, lesson materials and apparently reasoned responses with remarkable speed and sophistication. UNESCO, therefore, calls for a human-centred approach that protects human agency and places ethical and pedagogical considerations at the centre of AI use in education (Miao & Holmes, 2023).

The central educational danger, consequently, may not be that AI will replace teachers altogether, but that education may gradually redefine teaching as the delivery of information and learning as the production of acceptable answers. Such a reduction would make the teacher increasingly replaceable and the learner increasingly dependent. The OECD (2026) warns that outsourcing cognitive tasks to general-purpose generative AI can improve immediate task performance without producing corresponding learning gains, potentially encouraging cognitive disengagement and weakening the effort necessary for genuine learning. This situation demands a conceptual shift from replacement to complementarity. UNESCO's AI competency framework places human-centredness, ethics, pedagogy and human agency at the core of teachers' AI competencies, while its framework for students emphasises critical judgement and responsible engagement with AI (Miao & Cukurova, 2024; Miao et al., 2024). The educational task, therefore, is not to oppose human intelligence to artificial intelligence, but to establish a relationship in which technology extends human possibilities without displacing human agency. This paper argues that the future of education should be founded on human–AI complementarity: the teacher remains the human formator, the learner remains a personal thinker, and AI functions as an intelligent educational instrument. The decisive question is thus not whether AI can teach or think, but whether human beings can continue to teach and think meaningfully with AI.

From Teacher to Technology: Is the Teacher Becoming Replaceable?

The emergence of Artificial Intelligence (AI) introduces a profound and significant question into the philosophy of education: if technology can explain, instruct, assess, generate learning materials and respond to students, what remains uniquely necessary about the teacher? The question is not merely whether AI can perform particular teaching functions. It concerns the very meaning of teaching and whether the teacher is fundamentally a transmitter of knowledge or a human agent of formation. Generative AI has made this question urgent because educational technologies can now perform tasks once regarded as distinctively human, including lesson preparation, feedback, tutoring and aspects of assessment (OECD, 2026). Yet, to ask whether AI can replace the teacher may already presume an impoverished conception of teaching. If teaching means only the delivery of information, then the teacher is indeed increasingly replaceable. Information can be generated, reorganised and delivered by machines with extraordinary speed. But if teaching means forming a person who can understand, judge, relate, question and act responsibly, replacement becomes conceptually problematic. The teacher does not merely provide answers; the teacher creates conditions in which the learner learns how to ask meaningful questions, confront uncertainty and develop intellectual and moral judgement. In this sense, education is not simply a transaction between information and recipient; it is a relational process of human formation.

The distinction between replacement, complementation and augmentation is, therefore, crucial. The OECD (2026) explicitly identifies these as different modes of teacher–AI integration. Replacement occurs when AI performs tasks with minimal teacher involvement; augmentation strengthens teachers' existing capacities; and complementarity recognises that teachers and AI

may contribute different but mutually reinforcing potentialities and capabilities. The philosophical issue, consequently, is not whether AI should enter teaching but what kind of relationship between human intelligence and artificial intelligence education ought to cultivate. UNESCO's *AI Competency Framework for Teachers* similarly places human agency, ethical responsibility and a human-centred mindset at the heart of teachers' engagement with AI (Miao & Cukurova, 2024). AI, therefore, need not signify the disappearance of the teacher; it may instead expose the inadequacy of defining teachers merely by the tasks they perform. The more AI becomes capable of performing routine instructional functions, the more important the teacher's distinctly human capacities may become: presence, interpretation, discernment, empathy, mentorship, contextual judgement and formation. The real danger, therefore, is not simply technology replacing the teacher, but an educational philosophy that reduces the teacher to functions that technology can reproduce. The future of teaching should consequently move from teacher substitution to human–AI complementarity, preserving the teacher as the human centre of educational formation while employing AI as a powerful instrument of pedagogical enhancement.

From Thinking to Prompting: Is AI Outsourcing the Learner's Mind?

The deepest educational concern raised by Artificial Intelligence (AI) may not be that machines can produce answers, but that learners may gradually cease to experience the intellectual struggle through which answers become knowledge. Education has traditionally understood learning as an activity of the mind: questioning, remembering, interpreting, comparing, doubting, reasoning and arriving at judgement. Generative AI complicates this process by making the production of apparently sophisticated answers almost instantaneous. The question, therefore, is no longer simply whether students can obtain knowledge, but whether they are still thinking their way to knowledge. The distinction between thinking and prompting is philosophically significant. Thinking requires the learner to encounter a problem as a problem; prompting can transform the problem into a request for an already formulated response. When AI routinely supplies explanations, arguments, summaries and solutions, the learner may become increasingly skilled at obtaining cognitive products without necessarily developing the cognitive capacities that produced them. The danger is not AI assistance itself, but the gradual substitution of intellectual participation with technological delegation.

This concern becomes particularly important because educational success cannot be equated with task completion. UNESCO's *AI Competency Framework for Students* insists that learners require a human-centred mindset, critical judgement, ethical awareness and the capacity to understand, apply and create with AI (Miao et al., 2024). It specifically emphasises critical examination of the relationship between human and machine agency and encourages students to use AI to enhance human capacities while retaining human control. Thus, the educational problem is not that learners use AI, but how they use it and what cognitive responsibility they surrender to it. A student who asks AI to generate an answer and accepts it uncritically may complete an assignment while bypassing reflection. Conversely, a student who uses AI to challenge an argument, test an interpretation, compare perspectives or receive feedback may deepen rather than diminish personal thinking. UNESCO accordingly places critical thinking at the centre of meaningful engagement with AI and warns against treating AI as an answer to everything. □

The philosophical task, therefore, is to preserve the learner as a thinking subject. AI should extend the learner's intellectual reach without becoming a substitute for intellectual agency. The aim of education should not be to produce students who are merely proficient at prompting machines, but persons capable of thinking before prompting, questioning after receiving, and judging beyond what AI produces. In this sense, the future of AI-assisted education must be measured not by how much thinking AI can perform for learners, but by how much meaningful human thinking it enables learners to perform for themselves.

Teacher Replacement versus Human–AI Complementarity

The central thesis of this section is that AI should complement rather than replace the teacher because teaching is fundamentally an act of human formation, not merely the transmission of information. This distinction is crucial in determining the proper place of Artificial Intelligence in education. If teaching is reduced to explaining concepts, generating instructional materials, answering questions and evaluating responses, then increasingly sophisticated AI systems may appear capable of replacing significant aspects of the teacher's work. But such a reduction mistakes the *functions of teaching* for the *meaning of teaching*. The teacher's educational significance lies not simply in what is delivered but in how the learner is intellectually, relationally and ethically formed. The distinction between replacement and complementarity provides the conceptual basis for this argument. The OECD (2026) differentiates among AI replacing teachers' tasks, augmenting their capacities, and complementing their professional activity. Complementarity is particularly significant because it does not require human and artificial intelligence to perform identical functions. Instead, it assumes that their different capacities can be brought into a purposeful educational relationship. AI can extend access to information, generate alternatives, analyse patterns and provide rapid feedback, while the teacher retains responsibility for interpreting these possibilities within the concrete circumstances of the learner.

This thesis also rests on a philosophical distinction between information and formation. AI can produce information, but the educational value of information depends upon human judgement about its meaning, relevance and purpose. A generated explanation does not determine whether a learner understands it; an automated response does not determine whether the response ought to be accepted; and an algorithmic recommendation does not remove the teacher's responsibility to judge what is educationally appropriate. UNESCO's *AI Competency Framework for Teachers* consequently identifies human-centredness, ethics, pedagogical knowledge and human agency as essential dimensions of teachers' engagement with AI (Miao & Cukurova, 2024). Human–AI complementarity, therefore, means keeping the teacher within the centre of pedagogical judgement while moving AI into the sphere of intelligent assistance. The teacher need not compete with AI in speed, memory or information processing. Rather, the teacher determines when, why and how AI should be employed. In this arrangement, AI becomes an extension of pedagogical capacity without becoming the source of pedagogical authority.

The argument can consequently be stated simply: AI may replace some teaching tasks, but it should not replace the teacher as a human agent of formation. The educational future should therefore be conceived not as a movement from *teacher to technology*, but from teacher-only pedagogy to human–AI complementarity, where technology expands what teachers can do while human beings retain responsibility for what education ultimately seeks to accomplish. I would make the opening a single, forceful thesis: AI should complement, not replace, the teacher because teaching is fundamentally an act of human formation whose essential tasks—pedagogical judgement, relational engagement, contextual interpretation and responsibility—cannot be reduced to the automated production of information.

The Teacher as Human Formator in the Age of AI

The central thesis of this section is that the rise of Artificial Intelligence does not make the teacher less necessary; it makes the teacher's role as a human formator more necessary and more visible. As AI increasingly performs informational and instructional tasks, the distinctive meaning of teaching must be located beyond the delivery of knowledge. Teaching is ultimately concerned with the formation with proper information of persons capable of thinking, judging, relating and acting responsibly. The teacher, therefore, is not simply a source of information but a human presence through which knowledge acquires context, purpose and formative significance. Generative AI can produce explanations, questions, lesson plans, feedback and other instructional resources with remarkable speed. The OECD (2026) consequently argues that AI can augment teachers' capacities when its use is guided by clear pedagogical purposes and when teacher agency remains central. It warns, however, that AI should not replace the cognitive effort or human relationships that constitute meaningful education. This distinction

reveals an important philosophical principle: the more technology assumes the function of information provision, the more education must recover the function of human formation.

Human formation cannot be reduced to the successful transmission of contents. A teacher encounters a learner as a person rather than merely as a recipient of data. The teacher interprets difficulties, recognises potential, challenges assumptions, encourages intellectual courage, show empathy when need arises and cultivates habits of judgement. Such activities involve relational and contextual dimensions that cannot simply be derived from the computational production of responses. The OECD (2026) describes complementarity precisely in terms of AI's strengths in processing, pattern recognition, speed and scale working alongside human strengths such as empathy, contextual judgement and moral discernment. This does not mean that the teacher should resist AI. Rather, the teacher must become AI-literate without becoming AI-dependent. UNESCO's *AI Competency Framework for Teachers* places a human-centred mindset, ethics, AI pedagogy and professional learning among the core competencies required of teachers. It specifically emphasises human agency and accountability, indicating that teachers must remain capable of determining how and when AI should be used pedagogically (Miao & Cukurova, 2024).

The teacher's future significance, therefore, lies not in competing with AI's computational abilities but in exercising what AI cannot legitimately own: educational purpose. The teacher determines what is worth knowing, why it matters, how it should be interpreted and what kind of person the learner ought to become. AI may assist this process, but it cannot legitimately define its ultimate purpose. The teacher in the age of AI is thus best understood as a human formator: one who uses technology without surrendering educational judgement, employs intelligence without abandoning relationality, and embraces innovation without displacing human agency. The future of education is consequently not the disappearance of the teacher, but the transformation of the teacher from primarily an information provider into an increasingly deliberate guide, mentor, interpreter and formator of human persons.

The Learner as Personal Thinker in the Age of AI

The central thesis of this section is that AI should extend the learner's capacity to think, not substitute for the learner's responsibility to think. Education becomes intellectually diminished when the learner's achievement is measured by the quality of an AI-generated answer rather than by the quality of the learner's own understanding and judgement. In this sense, the fundamental question in the age of AI is not whether learners can obtain answers more efficiently, but whether they remain thinking subjects in the process of learning. Personal thinking involves more than possessing information. It is the learner's capacity to question, interpret, compare, reason, evaluate and arrive at considered judgement. These activities require intellectual effort, including the productive struggle through which understanding is formed. The OECD (2026) cautions that unrestricted use of general-purpose GenAI can improve students' immediate task performance while producing little or no corresponding learning gain because cognitive tasks are outsourced to the technology. In some cases, such outsourcing can weaken engagement and the development of independent skills.

The philosophical danger, therefore, lies in cognitive substitution. When AI routinely formulates the question, constructs the argument, solves the problem and writes the conclusion, the learner may become proficient in obtaining knowledge without adequately participating in its construction. Prompting can then replace pondering; retrieval can replace reflection; and polished output can conceal shallow understanding. The problem is not the presence of AI but the displacement of the learner's intellectual agency by AI. UNESCO's *AI Competency Framework for Students* addresses this precisely by placing a human-centred mindset, critical judgement and ethical responsibility at the centre of AI competence. Students are conceived not merely as consumers of AI-generated content but as responsible users and co-creators capable of critically examining the relationship between human and machine agency (Miao et al., 2024). Consequently, the AI-literate learner should not be defined simply as one who knows

how to prompt effectively. The deeper competence is knowing when to think independently, when to consult AI, how to interrogate its response, and when to reject it. AI should become a dialogical partner in learning rather than a cognitive surrogate. The learner in the age of AI must, therefore, remain a sole or personal thinker: one who uses artificial intelligence without surrendering intellectual agency. The measure of educational success is not how little the learner has to think because of AI, but how intelligently AI enables the learner to think more deeply, critically and independently.

Human Intelligence and Artificial Intelligence: The Defining Point

Human Intelligence (HI) and Artificial Intelligence (AI), converge in their capacity to perform tasks associated with learning, reasoning, problem-solving, prediction and decision-making, but they fundamentally differ in origin, nature and purpose. It's a form of complementarity. Human intelligence is a natural, embodied and lived capacity of the human person. It involves the ability to learn from experience, adapt to changing circumstances, understand situations, derive information and employ reason (American Psychological Association [APA], 2018). UNESCO similarly describes human intelligence as involving learning, reasoning, problem-solving, adaptation, perception, memory and decision-making (UNESCO, n.d.). Thus, human intelligence is not merely computational; it is situated within consciousness, experience, emotion, embodiment, social relationships, values and intentionality.

Artificial Intelligence, by contrast, is a human-created technological capacity designed to perform functions that ordinarily require aspects of human intelligence. UNESCO describes AI as systems capable of processing data in ways that resemble intelligent behaviour, including learning, reasoning, perception, prediction and problem-solving (UNESCO, 2021). Contemporary AI systems achieve impressive performance through algorithms, data, computational power and statistical pattern recognition. They can, therefore, generate language, recognise images, analyse information and make predictions without possessing the biological and experiential foundations of human intelligence (Stanford HAI, 2025).

The defining point, therefore, is that human intelligence is an intrinsic capacity of a living, conscious and meaning-making person, whereas artificial intelligence is an engineered capacity of a technological system to simulate or perform selected functions associated with intelligence. AI may reproduce aspects of intelligent performance without necessarily possessing human consciousness, lived experience, moral agency or intrinsic understanding. Indeed, current AI can outperform humans in particular benchmarked tasks while remaining unreliable in other forms of reasoning and generalisation (Stanford HAI, 2025). For education, this distinction is decisive. The human being remains the source of educational intentionality, judgement, values and meaning; AI remains an instrument that can extend, assist and augment human intelligence. Consequently, AI should not be understood as replacing the teacher's or learner's intelligence, but as a technological assistant whose educational value depends upon responsible human direction.

Towards a Complementary Pedagogy of AI, Digital Literacy and EduTech

The central thesis of this section is that the educational value of AI, digital literacy and EduTech depends not on their capacity to replace human teaching and thinking, but on their capacity to enter into a complementary relationship with them. A complementary pedagogy, therefore, begins with a simple principle: technology should extend human educational capacities without displacing human agency. The question is not how much technology can take over, but how technology can be deliberately integrated into teaching and learning without allowing efficiency to become the measure of education. Such a pedagogy requires a redefinition of digital literacy. Digital literacy can no longer mean merely knowing how to access, operate and produce through digital tools. In an AI-mediated environment, it must include the capacity to question technological outputs, evaluate their credibility, recognise limitations and bias, and determine when technological assistance is appropriate. UNESCO's AI Competency Framework for Students places human-centredness, ethics, AI techniques and system design

within a developmental framework that moves learners from understanding to application and creation (Miao et al., 2024).

Complementary pedagogy consequently positions the teacher, learner and technology in differentiated but interconnected roles. The teacher provides pedagogical purpose, contextual judgement and human formation; the learner provides intellectual agency, curiosity and personal judgement; AI and EduTech provide computational, informational and adaptive capacities. None of these roles needs to eliminate the others. Indeed, the OECD (2026) argues that generative AI can support learning when its use is guided by clear teaching principles, while poorly guided use may improve the quality of completed tasks without producing genuine learning. The principle of complementarity, therefore, introduces an important pedagogical hierarchy: technology serves pedagogy; pedagogy serves learning; and learning serves human development. This hierarchy prevents AI from becoming an educational authority merely because it is technologically powerful. The teacher remains responsible for determining the educational purpose, the learner remains responsible for engaging intellectually with the task, and technology remains an instrument through which those purposes may be enhanced.

Such an approach also requires teachers themselves to become critically AI-literate. UNESCO's *AI Competency Framework for Teachers* places human-centred pedagogy, ethics, professional learning and responsible technological practice at the centre of teacher competence (Miao & Cukurova, 2024). AI competence, therefore, is not simply technical competence; it is the capacity to make pedagogically intelligent decisions about technology. A complementary pedagogy ultimately seeks neither technological rejection nor technological surrender. It seeks integration without substitution, augmentation without dependency, and innovation without the loss of human agency. Its governing principle can, therefore, be stated succinctly: AI should assist teaching, digital literacy should cultivate discernment, EduTech should expand educational possibilities, but the human teacher and thinking learner should remain at the centre of education. In this sense, the future of education is not *human versus machine*, but human with machine, under human educational purpose.

Conclusion: The Teacher Teaches, the Learner Thinks, AI Assists

The question before education in the age of Artificial Intelligence is ultimately not technological but philosophical: what must remain human when intelligence itself can be technologically reproduced? This paper has argued that the answer lies in preserving the irreducible relationship between teaching, thinking and human formation. AI may reproduce information, simulate explanation and assist cognition, but education cannot be reduced to these functions. Its deeper task is to form persons who can understand, judge, question and take responsibility for what they know and do. This is why the distinction between replacement and complementarity matters. Replacement treats the teacher and learner principally in terms of tasks that technology can perform. Complementarity begins elsewhere: with the recognition that human and artificial intelligence do not occupy the same educational position. AI can process, generate, compare and assist at extraordinary speed; the teacher exercises pedagogical judgement and human formation; the learner exercises personal agency through thinking. The OECD (2026) similarly cautions that generative AI may improve task performance without producing equivalent learning when cognitive work is simply outsourced.

The philosophical danger, therefore, is not AI itself but the surrender of human agency to AI. A teacher who delegates judgement to a machine ceases to teach in the fullest sense; a learner who delegates thinking to a machine ceases to learn in the fullest sense. UNESCO's frameworks consequently place human agency, ethics, critical judgement and human-centredness at the heart of AI competence for both teachers and students (Miao & Cukurova, 2024; Miao et al., 2024). The proper educational order must therefore remain clear: technology serves pedagogy; pedagogy serves learning; learning serves human formation. AI belongs within this order—not above it. Its value is determined not by how much human activity it replaces, but by whether it deepens human capacity.

Thus, the future teacher is not the teacher defeated by AI, but the human formator who knows how to use AI without surrendering educational judgement. The future learner is not the learner who merely prompts effectively, but the personal thinker who can question even the answer produced by the machine. The philosophical principle of this paper can finally be stated in three verbs: *The teacher teaches. The learner thinks. AI assists.* The order is deliberate. Teaching remains human formation; thinking remains personal agency; assistance remains technological service. Human–AI complementarity is therefore not a compromise between teacher and machine. It is a philosophical insistence that technological intelligence must remain within, and accountable to, the purposes of human education.

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