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ORIGINAL

Imaginaries of the future: towards a humanly intelligent education

Imaginarios del futuro: hacia una educación humanamente inteligente

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ABSTRACT

This chapter examines the future imaginaries that shape the adoption of emerging technologies and AI in education. We juxtapose techno-optimistic narratives—mass personalization, process automation, expanded access to knowledge—with critical perspectives that warn about dehumanization, surveillance, standardized thinking, and the erosion of academic labor. From pedagogical and ethical standpoints, we deconstruct technological solutionism and analyze asymmetries linked to the digital divide, technological sovereignty, and data governance. Building on this, we advance the notion of a humanly intelligent education, centered on non-automatable competencies (critical thinking, creativity, collaboration, empathy, ethical judgment), on curricular redesign with situated learning and authentic assessment, and on the reflective use of AI as an augmentation—not a replacement—of teachers. The chapter closes with guidelines for responsible integration: pedagogical relevance, algorithmic transparency, inclusion, and sustained faculty development. We argue that education's future relies less on amassing digital tools and more on pedagogical projects that cultivate human capacities in critical dialogue with technology.

Keywords: Artificial Intelligence; Educational Innovation; Humanistic Pedagogy; Critical Thinking; Data Ethics; Technological Sovereignty; Authentic Assessment.

RESUMEN

Este capítulo analiza los imaginarios del futuro que orientan la incorporación de tecnologías emergentes y IA en los entornos educativos. Contrastamos narrativas tecno-optimistas —personalización a gran escala, automatización de procesos y acceso ampliado al conocimiento— con miradas críticas que alertan sobre riesgos de deshumanización, vigilancia, estandarización del pensamiento y precarización del trabajo docente. Desde una perspectiva pedagógica y ética, se deconstruye el solucionismo tecnológico y se examinan las asimetrías asociadas a brecha digital, soberanía tecnológica y gobernanza de datos. Sobre esta base, proponemos el marco de una educación humanamente inteligente, centrada en competencias no automatizables (pensamiento crítico, creatividad, colaboración, empatía y juicio ético), en el rediseño curricular con experiencias situadas y evaluación auténtica, y en el uso reflexivo de la IA como aumento del rol docente, no como su sustitución. El capítulo culmina con lineamientos para una integración responsable: pertinencia pedagógica, transparencia algorítmica, inclusión y desarrollo profesional docente continuo. Sostenemos que el porvenir educativo depende menos de acumular herramientas digitales y más de proyectos pedagógicos que potencien nuestra humanidad en diálogo crítico con lo tecnológico.

Palabras clave: Inteligencia Artificial; Innovación Educativa; Pedagogía Humanista; Pensamiento

Crítico; Ética de Datos; Soberanía Tecnológica; Evaluación Auténtica.

INTRODUCTION

The advancement of generative AI and its empowerment in the collective imagination. The title "Imaginaries of the future: towards a humanely intelligent education" invites philosophical reflection on how collective visions of what education could be in the age of artificial intelligence (AI) shape not only our pedagogical practices, but also our understanding of what it means to be human. These imaginaries are not just utopian or dystopian visions; they are narrative creations that bring together cultural values, technological expectations, and moral objectives. As educational AI continues to grow rapidly—expected to be worth $21 billion in 2025 and $58.2 billion in 2030—it is essential to consider futures where technology enhances human intelligence rather than replacing it (MarketsandMarkets, 2024, fact sheet). The title makes it clear that we need to think about futures where technology does not surpass people, but rather enhances their capabilities. This vision is similar to the concept of sociotechnical imaginaries as "collectively held visions of desirable futures" that can lead to new ideas but also perpetuate inequities if not critically analyzed.[1] Jasanoff[1] define sociotechnical imaginaries as shared ideas about what a promising future might look like. The edited book Dreamscapes of Modernity builds on and develops this idea.

Looking more closely, "Imaginaries of the Future" suggests the conflict between the possibilities of technology and our existential threats. We should use education to cultivate critical thinking and human agency, rather than just storing digital tools. How can we prevent generative AI algorithms from transforming learning into mechanical processes that deprive students of the ability to think critically in today's schools? According to educational philosophers, the naive use of AI could lead to a "passive dependence" that diminishes intellectual independence, particularly in Latin America, where neocolonial ideologies impose foreign narratives on local reality.[2] This study examine how Latin American sociotechnical imaginaries maintain an "algorithmic government" that reinforces neocolonial soft power. AI tools developed in the Global North are often not adapted to local cultural contexts, making them more challenging to access and less effective for teaching purposes.

Finally, "Towards a Humanly Intelligent Education" advocates for a dialectical synthesis: technology should support human thinking, not govern it. The goal is to transform people's view of technology and society in such a way that AI fosters curiosity, critical thinking, and creativity. Research suggests that a humanistic approach to education promotes cognitive freedom and aligns technological advancement with long-standing philosophical concepts, reducing ethical problems.[3] Rahm et al.[3] provide a "heuristic lens" for examining the imaginaries of educational AI in the British Journal of Educational Technology. They emphasize questioning its impacts to foster human agency over automation in education.

DEVELOPMENT

Contextualization and Problem Statement

Generative AI has transcended technology to shape current ideas about knowledge and creativity in education. An educational technology sociologist views this as an extension of the information society, where algorithms, such as GPT, evaluate data and alter learning experiences. Castells[4] argues that technology accelerates the flow of information in networked societies but unfairly prioritizes efficiency over social inclusion. By making text and image creation tools accessible to everyone, generative AI fosters creativity in education by enabling students to explore ideas without encountering technological issues. However, this cultural link also hides risks, as it prompts people to consider substitution, where computers replace human

cognitive effort and erode autonomy in teaching.

According to Floridi[5], generative AI is becoming a hybrid production tool that integrates human and artificial intelligence to generate instructional content. From a technology sociology perspective, this cultural empowerment links AI with creativity by enabling the collaborative creation of essays and simulations that expand educational boundaries. However, Floridi[5] is concerned that algorithmic efficiency could lead to an "infraethics" that replaces human judgment with mechanical judgments. Duolingo and Grammarly exemplify this trend, where AI is perceived as a tool to make learning more creative, but it also risks standardizing learning experiences. This dream reconfigures humans as nodes in informational networks, forcing education to strike a balance between technological progress and autonomy.

The growing use of computers in schools has caused a conflict between technical efficiency and humanistic teaching. Paulo Freire[6] states that treating students as "repositories" of knowledge hinders their ability to think critically and engage in independent conversations. Freirean critical pedagogy is based on people thinking for themselves, while automated selection and evaluation of materials perpetuate technocratic power dynamics.

AI's ability to personalize each student's learning could lead to greater inequality. Ivan Illich[7] argued that relying on specialized technological infrastructures to undermine education was a misguided approach. Selwyn[8] states that recent research indicates that automated tutoring systems promote normative learning and penalize cultural or cognitive differences by utilizing historical data that is not very objective due to socioeconomic factors.

Gert Biesta[9] asserts that education must include ethical and political dimensions in addition to assessing competence. This means that co-creation and critical, responsible thinking require teachers and students to be in contact with each other, which a fully automated assessment system reduces. Therefore, focusing too much on quantitative efficiency jeopardizes social justice and critical socialization.

Central Thesis: Towards a Humanly Intelligent Education

Morin[10] proposes that the complexity and uncertainty inherent in the digital age necessitate an education that fosters networked thinking, recognizing the interdependence of knowledge and existential dimensions. In this sense, AI must be incorporated into an educational project that fosters transdisciplinarity and the autopoiesis of knowledge, promoting individuals who can critically navigate the abundance of information. Only then will technology become a means of expanding the human, rather than replacing it, building a truly "humanly intelligent" education.

Key definition: What is "humanly intelligent education"?

Utilizing evolving technologies to enhance our humanity as rational beings, rather than merely incorporating technology into education. This chapter posits that the future of education depends on a human-centered educational approach that uses AI to enhance students' introspective, ethical, and creative skills. Freirian education[11] asserts that dialogue and critical reflection transform individuals and societies. Instead of promoting independence and community, the misuse of technology can perpetuate paradigms of banking knowledge and inequality.

Martha Nussbaum[12] says that storytelling, empathy, and moral reasoning are important for just and open democracies. AI that is easy to understand could help people make better moral decisions and learn in a more contextualized manner. We need to reinvent education and create spaces that leverage algorithmic technology for social equity and holistic growth.

Humanly intelligent education enhances complex human intelligence by integrating technology, ethics, empathy, and critical thinking.[13,14] Digital or technological education focuses on teaching technical skills, while humanely intelligent education focuses on teaching critical, contextual, and ethical skills. Dreyfus[15] emphasizes the importance of lived experience and

contextual awareness, which AI cannot replicate. Bostrom[16] proposes instructing humans to guide AI toward justice and democracy critically. Searle[17] emphasizes the need for reflective and ethical education, as robots can only process information syntactically, but humans understand it semantically. Humanly intelligent education utilizes AI to enhance people's skills rather than replace them. It teaches people how to navigate the digital world in a manner that promotes their social, emotional, and ethical development.[14]

The Sociotechnical Imaginaries of AI

This debate on the use of AI in schools is currently divided into two opposing viewpoints: techno-optimism and techno-pessimism. The techno-optimist sees global democratization and personalization as possible, while the techno-pessimist warns of algorithmic surveillance, systematic biases, and the dehumanization of learning. Although both perspectives affect the decisions made by educational institutions and programs, they do not often communicate with each other.[18,19]

The techno-optimistic imaginary: promises of personalization and universal access

The utopian vision posits that ChatGPT, adaptive virtual educators, and automated assessment systems will remove educational barriers and personalize learning experiences.[20] Kurzweil[21] believes that AI will facilitate the rapid dissemination of learning and new ideas, making information accessible to everyone. This notion suggests that AI-powered virtual tutors could provide students with rapid feedback, tailor lessons to their individual needs, and handle administrative tasks, allowing instructors to focus on more important aspects of learning.[20]

This appearance of widespread personalization masks more subtle changes. Recent research warns that adaptive systems utilize past data and typical performance patterns to encourage normal learning and penalize cognitive and cultural strategies that deviate from the norm.[22] Universal access overlooks the digital divide, whereby millions of students are denied access to essential technology.[8]

The techno-pessimistic imaginary: surveillance, bias, and dehumanization

Under the guise of technical neutrality, the dystopian dream warns that the blind use of AI in education reinforces and worsens structural injustices.[18,19] Zuboff[19] has shown how "surveillance capitalism" converts every interaction with a school into data for the behavioral prediction market. In education, platforms track every click, how long you read, and how often you make mistakes to create computer profiles that could affect your future academic and job prospects without political oversight or informed consent.[22] The OECD[23] suggests that to address issues such as a lack of transparency and injustice, we should establish trusted digital education environments with robust data control, reliable connectivity, high-quality standards, and adequate institutional capacity.

Evgeny Morozov[18] criticizes "technological solutionism," which reduces complex educational problems—such as inequality, lack of motivation, and poor teacher training—to "bugs" that can be solved by algorithms. This logic ignores the fact that education is fundamentally a social, relational, and political process, not a technical system that can be optimized through software engineering.

Tensions and possible paths

Both imaginaries contain partial truths and real risks. The key lies in constructing a third imaginary: that of a humanly intelligent education that critically incorporates AI as a means of amplifying human capabilities, under ethical, democratic, and social justice principles. This requires algorithmic transparency, equity audits, teacher training in critical digital literacy, and regulatory frameworks that subordinate market logic to the common good of education.[8,23]

CRITICAL DECONSTRUCTION OF "SOLUTIONISM"

Analysis of "technological solutionism"

This can be considered the belief that every educational problem has a technological solution.

The role of technology corporations in shaping society

Large technology corporations—such as Google, Microsoft, Amazon, and OpenAI—have consolidated unprecedented influence in shaping global educational agendas, operating as key actors in educational governance rather than mere service providers.[22] Unlike the traditional model of selling isolated educational tools, these companies offer integrated "technological ecosystems"—Chromebooks with Google Workspace, Surface devices with Office 365, Amazon Web Services cloud infrastructure—that create institutional dependency by interconnecting devices, educational software, data storage, and artificial intelligence services.[24]

Williamson et al.[22] document how Amazon has penetrated the education sector through a "connective architecture" of digital infrastructure that inscribes commercial business models, accustoms users to its technologies, creates interfaces with educational institutions, platformizes third-party providers, and seeks market dominance over key educational information infrastructures. This process of "Googlization" or "Microsoftization" of education not only determines which technologies are used, but also shapes what is considered "quality education," what data is collected, and how learning objectives are defined.[24] A study by Marone[25] on the communication strategies of Google and Microsoft in education reveals how these corporations frame technology as an inevitable agent of transformation, presenting teachers and students as "incomplete beings" who can only reach their full potential through the solutions they offer.

This technological deterministic discourse obscures the fact that corporate priorities—such as capturing user data, fostering early consumer loyalty, and expanding proprietary ecosystems—often contradict pedagogical principles of autonomy, critical thinking, and the educational common good.[22] The institutional dependence generated by these ecosystems poses structural risks, including the concentration of sensitive educational data in private hands without robust public oversight, curriculum design geared toward corporate needs rather than comprehensive student development, and the erosion of education as a common good by subordinating it to market logic.[26] As Selwyn[26] warns, the critical question is not whether corporate technology can "improve" education, but who defines what "improvement" means and what values and social goals guide that transformation.

Beyond the Algorithm: The Singularity of Human Intelligence

The current fascination with artificial intelligence generally leads us to a significant error (measuring human intelligence by machine standards). We applaud the high processing speed, incredible memory capacity (data storage), and pattern recognition, attributes in which AI greatly surpasses us and will continue to do so even more over time. However, this perspective overlooks the singularities present in human intelligence. For example, the ability to understand quality, not just computational numbers, is what matters. Understanding the computational benefits of artificial intelligence in different ways and reevaluating its dimensions are necessary steps in designing an education that nurtures our uniqueness rather than preparing us to compete with machines.

Redefining "Intelligence": Critique of the computational view and value of emotional, social, and bodily intelligence

Currently, there is a trend to popularize the concept of intellect (intelligence) as a synonym for logical information processing, a concept that has its origins in the rationalist philosophical tradition. However, it has been strongly criticized by leading figures in the fields of philosophy,

psychology, and now neuroscience, who strongly advocate the position that human intelligence is a holistic phenomenon that cannot be reduced to the mere manipulation of symbols or the simple computational handling of data.

Hubert Dreyfus (American philosopher and professor) was an early and insightful critic of "Strong AI" (the idea that a properly constructed computer program is a mind as well as a simulator). Inspired by Heidegger and Merleau-Ponty's phenomenology, Dreyfus stated in *"What Computers Cannot Do"* that experienced human intelligence is not based solely on the conscious application of formal rules or algorithms, as early AI researchers had initially structured it. Instead, experienced human intelligence is based on the ability to "know" intuitively, the capacity to react to unexpected events without conscious thought, which is acquired through years of experience in the world. This information operates against a vast "background" of tacit, contextual, and common-sense knowledge that cannot be codified into symbolic propositions or rules. An AI without a body, which gives it life experiences, needs, or a cultural context, cannot access this background; therefore, its "intelligence" is weak and restricted to small, formal domains.

In addition to Dreyfus's statements, philosopher Searle[17] proposed a famous thought experiment in the philosophy of mind in 1980: the "Chinese Room" thesis. Professor Searle asks participants to imagine a person who does not speak Chinese isolated in a room. Through a slot, they receive questions written in Chinese characters. Inside the room, they have a rulebook in their native language that tells them, step by step, how to manipulate those symbols to produce other Chinese characters as answers. By following the manual, the person can generate responses so coherent that an outside observer would believe that there is a native Chinese speaker inside the room. However, the person inside the room does not understand a word of Chinese; they are simply manipulating symbols that have no meaning for them. This experiment draws a fundamental distinction between syntax (the formal manipulation of symbols according to rules, which is what computers do) and semantics (genuine understanding of meaning, which is what minds do). Searle's conclusion is devastating for Strong AI: no matter how sophisticated a program is, it can never generate understanding on its own, since syntax is not sufficient for semantics. A computer, by definition, is stuck at the syntactic level.

More recently, Stuart Russell, one of the leading researchers in AI, has updated this line of criticism in his book *Human Compatible*. Russell critiques what he calls the "standard model" of AI, whose goal is to create machines that optimize the achievement of rigidly defined human goals as efficiently as possible. Russell highlights the great danger posed by the "King Midas problem," where he demonstrates that a super-intelligent AI that blindly pursues a literal goal (such as turning everything into gold) could have catastrophic consequences because our goals fail to capture the complexity, nuances, and contradictions of human values. In extreme cases, a computer programmed to maximize the manufacture of paper clips could use up all the Earth's resources without "understanding" that it contradicts higher human ideals. This criticism highlights the limitations of instrumental and computational intelligence: its inability to determine goals and its disregard for the vast array of human values not explicitly incorporated into its objective function.

A substantial amount of research in psychology and neuroscience has reevaluated the emotional, social, and physiological aspects of human intelligence in contrast to this narrow view of intelligence. Daniel Goleman's work on emotional intelligence marked a radical shift in this reevaluation. Presented in his book entitled Emotional Intelligence. Goleman summarizes and structures decades of data obtained in his research, as presented in his aforementioned book. He argues that a combination of social and emotional competencies predicts success and well-being in life at a considerably higher rate than conventional IQ. Social skills (managing relationships), self-regulation (managing one's own emotions), motivation (directing emotions toward goals), empathy (recognizing and understanding the emotions of others), and self-

awareness (recognizing one's own emotions) are the five main components of emotional intelligence, according to Goleman. He argues that emotional education is at the core of a humanly intelligent pedagogy, since people can and should learn these skills, which are not natural.[27,28]

This pluralistic, multidimensional approach to human intelligence was advanced and extensively studied by Howard Gardner in his Theory of Multiple Intelligences, presented in *Frames of Mind*. Gardner challenged the monolithic idea of a single general intelligence (the "g" factor), proposing the existence of at least eight distinct and relatively autonomous intelligences, each with its own neurobiological basis and developmental trajectory. Beyond the linguistic and logical-mathematical intelligences traditionally valued by schools, Gardner identified intelligences such as musical, spatial, bodily-kinesthetic (the intelligence of the body, movement, and manipulation), interpersonal (the ability to understand and interact effectively with others, similar to social intelligence), and intrapersonal (the ability to understand oneself, a pillar of Goleman's self-awareness). Gardner's framework provides crucial theoretical validation for an education that not only addresses the abstract mind but also educates the whole human being, encompassing their body, emotions, and relationships.

Finally, neuroscientist Antonio Damasio provided the biological basis for the inseparability of reason and emotion. In his influential book *Descartes' Error*, Damasio demonstrates, through the study of patients with brain damage in the frontal lobe, that the ability to feel emotions is not an obstacle to rationality, but a necessary condition for it. As a result of their injuries, patients such as Phineas Gage, who were unable to feel emotions, retained their intellectual and logical abilities but were unable to make wise decisions in their social and personal lives. Damasio developed the "somatic marker hypothesis" in light of these findings. He suggests that if we associate emotional and physical signals ("somatic markers") with the possible repercussions of our decisions based on our previous experiences, we can quickly eliminate undesirable possibilities and focus on the most promising ones, thanks to these signals, which serve as cognitive shortcuts. Without these indicators, deliberation becomes an endless and immobilizing calculation of advantages and disadvantages. Damasio shows how a detached and emotionless intellect (present in AI) is, by definition, insufficient for decision-making and action.

Theorists of human intelligence and philosophers who criticize AI both reach the same compelling conclusion: accurate intelligence is emotional, social, and lived. Philosophers such as Dreyfus and Searle arrive at this conclusion through conceptual analysis, demonstrating that a formal and impersonal system cannot acquire knowledge rationally. The a priori limits of computational intelligence are exposed by their reasoning. However, when examining the brain and human behavior, researchers such as Goleman, Gardner, and Damasio reach the same conclusion based on real data. They discover that intelligence, *de facto,* does not operate like a computer program. Emotion, social interaction, and the body are not mere accessories to cognition, but its fundamental substrate.

The connection between the two perspectives is profound. The non-formalizable "background" that Dreyfus identifies as essential to expertise is, to a large extent, the tacit knowledge accumulated through the emotional and bodily experiences that Damasio and Gardner describe. The "semantics" or meaning that Searle claims is missing in the Chinese Room is generated, in humans, through the affective and social interaction that Goleman considers central to a successful life. Therefore, an educational proposal that prioritizes computational logic, algorithmic efficiency, and purely quantitative metrics is not only neglecting so-called "soft skills." It is, more fundamentally, undermining the very foundations of human intelligence as science understands it. Such pedagogy would be training students to emulate a form of intelligence—that of the machine—that is inherently limited and fragile, rather than cultivating the form of intelligence that is their own, one that is robust, flexible, and deeply human.

The Core of Humanity: Critical Thinking, Creativity, Collaboration, and Ethical Literacy

If human intelligence does not reside in the ability to process data faster than a machine, where then does its distinctive value lie? In an automated, information-saturated world, the competencies that define our humanity and ensure our relevance are not those that compete with AI on its own turf of computational efficiency. Instead, they are those that operate on a qualitatively different plane: that of judgment, imagination, cooperation, and moral deliberation. These four competencies—critical thinking, creativity, collaboration, and ethical literacy—constitute the core of a humanly intelligent education, the bulwark of what machines cannot, and perhaps should never, replicate.

Critical thinking has become more indispensable than ever precisely because of the nature of the digital ecosystem. The information age has brought with it an "infodemic": an overabundance of information, often false or misleading, that spreads virally. As documented an study, fake news is significantly more likely to be retweeted than real news. Added to this are the "echo chambers" and "information silos" created by the personalization algorithms of platforms such as Facebook and YouTube, which lock us into content loops that reinforce our existing beliefs and limit our exposure to divergent perspectives. In this context, as Rómulo A research warns, mere immersion in technology can have the paradoxical effect of stunting, rather than cultivating, higher-order cognitive processes. Education must therefore undergo a fundamental shift: from teaching "what to think"—transmitting a body of established knowledge—to teaching "how to think" in a complex and often hostile information landscape. Lipman considers critical thinking to be "skilful and responsible thinking that facilitates good judgment" rather than a simple logical skill. It is essential to acknowledge that Lipman recognized this type of thinking as occurring within a "community of inquiry," an environment characterized by fluid dialogue where concepts are collectively examined, challenged, and refined, rather than existing in isolation.

Creativity enables us to envision and construct a society as it could be, while critical thinking empowers us to navigate society as it is. These are the most fundamental human characteristics. Generative AI lacks the intentionality, subjective experience, and intrinsic desire that define human creativity, even though it can create different types of text, art, and music in amazing ways by recombining pre-existing patterns. In his theoretical concept of "flow," Mihaly Csikszentmihalyi characterizes the creative process as an "optimal experience" rather than a mere outcome. The state of flow is a condition of complete absorption in an activity, where time seems to stand still. The difficulty of the task and the person's abilities are perfectly balanced, and the action itself becomes its own reward. Originality thrives in this rich and human condition. Although imagination is important, Sir Ken Robinson has argued strongly in books such as *Out of Our Minds* that our schools have consistently suppressed and underestimated these traits. Uniformity, regulation, and a strict order of subjects, placing languages and mathematics at the top and the arts at the bottom, are characteristics that schools emphasize in students all the time. This causes them to "unlearn" their natural creativity. This trend must be stopped by an education that is humanly intelligent and views imagination as a skill that everyone possesses and should be encouraged throughout education, rather than perceiving it as a gift for only a few people.

Collaboration is essential in a society facing complex global problems, such as climate change and emerging pandemics that remain undetected and unaddressed. Even though we are brilliant, no one has all the information to address these problems. Philosopher Pierre Lévy proposed the concept of "Collective Intelligence." Lévy calls it "an intelligence distributed everywhere, constantly valued, coordinated in real time, leading to the effective mobilization of competencies." With its communication and cooperation facilities, cyberspace is ideal for distributed intelligence, where the knowledge of a group far exceeds that of its individual members. Education can no longer focus solely on student development. It must educate

students to work in small teams and to engage, contribute, and co-create in large learning communities, becoming competent and constructive nodes in these knowledge networks.

Ultimately, ethical literacy emerges as a fundamental competency in an increasingly complex and opaque technological landscape. Using a digital tool without critical thinking would be useless and dangerous. The frameworks for Global and Digital Citizenship Education proposed by global organizations, such as UNESCO, empower students to address global issues and contribute to the formation of a more peaceful, tolerant, and inclusive world.[29] Media and Information Literacy develops the ability to access, analyze, evaluate, and generate communication in various circumstances. The need to incorporate these skills into educational programs to train critical and ethical citizens who can address various concerns inherent in the AI ecosystem, such as *deepfake* disinformation.

Critical thinking, creativity, teamwork, and ethical literacy should not be valued separately. Meta-competence, such as ethical literacy frames, guides, and gives them human meaning. Without an ethical foundation, critical thinking can become cynical or turn into a cunning weapon for manipulation and deception. Creativity without guidance can lead to socially harmful "innovations," from more intrusive surveillance to more successful disinformation operations. Without an ethical foundation, a criminal organization or internet mob could collaborate to harass and silence their opponents. Ethical literacy, therefore, underpins the other three competencies. Provide your key questions for the application: What is the focus of critical thinking? Who benefits from creativity? What is collaboration for? Unethical teaching of these competencies abdicates the educational duty. Humanly intelligent pedagogy must make ethical deliberation the basis of all learning activity, using it to practice and evaluate all other skills.

Toward a Humanly Intelligent Pedagogy: Principles and Practices

Adopting an expanded view of intelligence and focusing on fundamental human competencies requires a profound transformation not only of "what" is taught, but more importantly, of "how." A humanly intelligent education that is not cannot be delivered through structures and methodologies inherited from the industrial age, designed for the efficient transmission of standardized knowledge. It demands the application of a reengineering in the pedagogical educational context in which the student becomes the center of every active, collaborative, and reflective process. This implies a metamorphosis of the teaching role, the intentional design of learning experiences that cultivate these competencies, and a radical reimagining of the purposes and methods of assessment.

The New Role of the Teacher: From transmitter to curator, designer, and ethical guide

The abundance of information and AI has irrevocably eroded the role of the teacher as the primary transmitter of knowledge in the digital age. With rapid access to a wealth of material and AI assistants, the value of educators goes beyond the presentation of the curriculum. This apparent loss of authority has freed up higher-value tasks that robots cannot replicate and that are essential for meaningful 21st-century learning. A "sage on the stage" becomes a "guide on the side," balancing the roles of network navigator, content facilitator, experience designer, and ethical mediator.

To understand this change, the thesis of connectivism, as presented by George Siemens and Stephen Downes, is powerful. According to connectivism, learning in the digital age is increasingly about developing, maintaining, and navigating knowledge networks. People, databases, and other non-human entities share knowledge across the network. The ability to obtain essential information, known as "know-where," becomes more important than the current knowledge one already has ("know-what") and "know-how," according to Siemens. Consequently, teachers now facilitate relationships rather than impart knowledge. In this methodology, "teaching is modeling and demonstrating, learning is practicing and reflecting," reports Downes. Students

learn to design and maintain their own personal learning environment, evaluate the reliability of sources, and synthesize knowledge from various points of view or sources, considering the teacher as a source of valid experiences within the knowledge network. Teachers become guides within the knowledge network when they help students.

In a noisy information environment, mentoring is crucial for effective teaching. The teacher's job is to review, select, put into perspective, and organize learning resources for high quality, much like a museum guide does. This method helps students save time, reduce their cognitive load, and develop the ability to think critically about what they read. Teachers need to do more than select resources; they also need to evaluate them. It is now their job to provide learning opportunities. Their main task becomes creating supportive environments and seeking out innovative challenges, projects, and lessons that encourage students to ask questions, work together, and apply what they know in real-life situations. Instead of simply sharing information, utilize digital tools for research, creation, and communication to create "learning paths" that students can follow with complete freedom.

Teachers become agents of great importance as guides and moral arbiters when it comes to AI technologies that are difficult to understand (biased) and seek to raise ethical questions. [30] Without prohibiting its use (AI), teachers must educate students on how to use these tools responsibly, critically, and thoughtfully. This requires ongoing classroom discussions about the origins of AI-generated data. What types of biases exist? What impact does this technology have on society? When is it okay to let a machine perform cognitive activities, and when is it necessary to make decisions yourself? The instructor should help students think critically, analyze, and be aware by asking them questions that prompt them to do so. This significant change in the role of the teacher is summarized in the following comparative table:

Table 1. Evolution of the Teaching Role and the Learning Process

Dimension	The Traditional Model (Transmitter)	The Humanly Intelligent Model (Facilitator)
Main Role	Transmitter of knowledge, central authority.	Content curator, experience designer, ethical guide.
Source of Knowledge	The teacher, the textbook (static knowledge).	The network, the learning community, the student themselves (dynamic and distributed knowledge).
Learning Process	Passive, receptive, individual (Freire's "banking education").	Active, constructive, collaborative (PBL, dialogue).
Focus Assessment	Measurement of knowledge retention (standardized tests).	Assessment of the process, development of knowledge and skills, formative feedback.
Use of technology	Presentation tool or content repository.	Learning environment, tool for connection, creation, and critical reflection.

Designing Learning Experiences: PBL, Socratic dialogue, and metacognition

A humanely intelligent pedagogy does more than declare the need for 21st-century skills; it must put them into action through teaching and learning approaches framed within the ideals of a balanced and humane society. When we set ourselves the goal of promoting and enhancing critical thinking, creativity, cooperation, and autonomy, then the pedagogical strategies and tools that will become inputs for education must necessarily be active, student-centered, and focused on reflective dialogue. Based on the above, three pedagogical methods stand out for their ability to incorporate the aforementioned principles: first, project-based learning (PBL); second, Socratic dialogue; and third, the explicit promotion of metacognition.

The methodology known as "Project-Based Learning (PBL)" involves students actively experiencing and addressing a challenging topic or problem over a predetermined or approximate period of time. The collaborative process comprises several phases, including formulating a

guiding question, organizing the work to be researched, creating a product or solution, presenting the results, and reflecting on the process. This method is essentially interdisciplinary, promoting the concurrent development of various skills. To understand the problem, you need to think critically; to generate new ideas, you need to be creative; to work as a team, you need to operate effectively as a team; and to share findings, you need to communicate effectively. They highlighted the need for a pedagogical design that integrates activities, resources, and assessment around the student coherently and fluidly. Studys stated that project-based learning (PBL) and transdisciplinary initiatives improve academic performance by promoting critical thinking and creativity.

While Socratic dialogue emphasizes rigorous and cooperative growth of knowledge, PBL places more emphasis on action and invention. This ancient teaching strategy remains highly effective today because it acts as a counterbalance to the mindless consumption of information that characterizes both "financial education" and the careless use of digital media. Socratic dialogue is a cooperative inquiry in which participants analyze their own ideas and those of others to gain a deeper understanding of the truth, rather than engaging in a competitive argument to win a point. Through a series of rigorous questions and answers, the group attempts to arrive at a synthesis (a new understanding that integrates and transcends the original positions). The method uses a dialectical process, where one participant presents a thesis (a belief or statement), to which another responds with an antithesis (an objection or opposing point of view). The instructor facilitates the conversation by asking incisive questions that encourage conceptual clarity and logical coherence, rather than acting as an authoritarian figure with predetermined answers. Through respectful analysis of individual ideas by the community, this approach reduces cognitive biases by promoting intellectual humility, active listening, and the development of sound arguments.

PBL and Socratic dialogue require students to take an active role in their own education. This autonomy must be specifically developed by encouraging metacognition, as it does not develop naturally. The ability to recognize and control one's own cognitive processes is known as metacognition, or "thinking about one's own thinking". Planning, monitoring, and evaluation are the three main stages of this self-regulation process. All learning experiences should incorporate metacognitive techniques, as recommended by humanly intelligent pedagogy. Self-assessment rubrics that allow students to apply quality criteria to their own work, learning journals (field notebooks) that allow students to reflect on what and how they have learned, and thinking exercises such as "3-2-1 Bridge" (ideas, questions, and analogy) this exercise helps students activate their prior knowledge while making their own learning visible (being aware of what they learn, why they learn, and how they learn), is one of many examples of this type of pedagogical tool. The so-called "metacognition ladder," popularized by Robert Swartz, is another helpful tool that guides students through four reflective steps: recognizing their own thinking patterns, determining the strategy used, evaluating its effectiveness, and planning their future application of what they have learned. For the above to work, the teacher must explain problems as clearly as possible, show students how they think aloud, and, most importantly, reserve time and space in the classroom for this intentional thinking.

Authors in their research on skill development and relevant learning, respectively, have stated that combining these methods creates a solid educational environment. Metacognition teaches students to carry out the process themselves, making them aware and capable of constructing their own knowledge. Project-based learning (PBL) fosters a real and inspiring environment, and Socratic dialogue empowers students to ask challenging questions in a collaborative setting.

Reimagining Assessment: Beyond standardized testing, using AI for formative feedback

As we move toward education that resembles human intelligence, assessments will need to be rethought. However, assessment methods are not objective tools; instead, they provide

students with strong clues about what truly matters in the learning journey. When standard multiple-choice tests are used to assess basic memory, and the need for imagination and critical thinking is emphasized, then any case will be weak. To change this, assessment must shift from being an external, final process to being viewed as an integral part of learning—a genuine, developmental process focused on skill development. Interestingly, AI is often perceived as a threat, but when used correctly, it can actually be a powerful ally in this transformation.

Many members of the academic community dislike the way traditional assessment is carried out. We cannot measure the complex skills that make humans intelligent with simple standardized tests, as these are designed to be quick and applied to large groups of participants (students). If we want to analyze and determine how original a creative response is, how solid a critical argument is, or how a team functions, we cannot rely on a series of multiple-choice questions. In 2013, María Elena Córdoba pointed out that conventional assessment often prioritizes material that is easy to assess over authentic learning. This causes students to ignore important parts of the curriculum that will not be "assessed" and to use superficial ways of learning.

The Authentic Assessment paradigm was proposed as a response to these limitations. This method suggests that students be assessed through relevant activities and situations, contextualized to the difficulties they would face in the real world. Students should be required to solve a case study, develop an experiment, write a report for a specific audience, or create a product using what they have learned, rather than being made to memorize facts. Authentic assessment, as defined by Córdoba's guidelines, incorporates numerous measurement techniques (not just a final test), values the process as much as the final result, and requires the application of higher-order cognitive skills such as evaluation, synthesis, and analysis.

The e-portfolio, or digital portfolio, is now one of the best ways to conduct authentic assessments. A portfolio is more than just a collection of a student's work; it is a carefully planned compilation of information that demonstrates how they have grown, learned, and achieved over time. The digital format facilitates the addition of a reflective dimension, as it enables the use of a wide range of materials, including texts, audio recordings, films, and simulations. Students must not only display their artwork, but also discuss how they created it, the challenges they encountered, and what they learned. The e-portfolio is a powerful metacognitive tool that allows students to take charge of their own learning and self-assess.

AI can also help teachers create better exams and quizzes. The National Institute of Educational Technologies and Teacher Training (INTEF) in Spain has demonstrated to teachers how to utilize language models and well-crafted prompts to develop rubrics, self-assessment surveys, and peer assessment criteria tailored to specific learning environments. AI does not just provide grades; it helps teachers create more in-depth, student-centered tests. John Biggs' theory of constructive alignment states that to achieve deep, learning, learning, teaching methods and assessment tasks must be in tune with each other. We need sophisticated, real-world tests to accomplish complex tasks effectively. If ethical issues such as privacy, bias, and transparency are addressed, AI could facilitate the conduct of honest and practical assessments, and its use could be more widespread.

Ethical Challenges and Social Gaps in the Transition

Transforming education to be both humanly intelligent and technology-enabled is challenging and potentially hazardous. If not critically examined, tools that promise to personalize learning and free teachers from repetitive tasks can become sources of inequality, monitoring, and control. Educational technologies are shaped by the ideals, biases, and economic logic of their designers. Ignoring this social aspect is foolish and can undermine equality and autonomy in the educational system. Therefore, educational innovation projects must analyze the ethical and social problems that technology could generate or exacerbate.

Algorithmic Biases and Equity

One of the most appealing and dangerous narratives in the digital world is that computers can make more "objective" decisions than humans. AI systems that evaluate students, anticipate dropouts, and personalize learning represent this potential in education. These methods embed, magnify, and hide biases under the guise of mathematical impartiality, according to a growing body of critical studies.

Mathematician and data scientist Cathy O'Neil introduced the term "Weapons of Math Destruction" (WMDs) to identify opaque, large-scale algorithms that negatively affect people's lives. WMDs create dangerous feedback loops. The "value-added" methods used in certain US school districts to evaluate teachers based on standardized test results are examined by O'Neil. They penalized teachers working with disadvantaged students, whose achievements are affected by many socioeconomic circumstances beyond the teacher's control. The algorithm mislabeled these teachers as "ineffective" and fired them, exacerbating educational inequality by depriving schools that needed them of experienced teachers.

Sociologist Ruha Benjamin delves deeper into this critique with her concept of the "New *Jim Code*," outlined in her book *Race After Technology*. Benjamin[32] argues that new technologies, despite their rhetoric of progress and neutrality, often function to reinforce white supremacy and social inequality in subtle but powerful ways. This "New Jim Code" operates through "discriminatory designs" that can: a) explicitly amplify existing racial hierarchies; b) replicate social divisions simply by ignoring them (bias by omission); or c) attempt to "correct" bias in ways that, paradoxically, make it worse. An AI-based college admissions system, for example, trained with historical admissions data, will learn to associate "success" with the profiles of students who have been admitted in the past (often white and from privileged classes), thus discriminating against candidates from underrepresented groups, even if race is not an explicit variable in the model.

Safiya Noble illustrates how search engines and other platforms that we take for granted as our "windows to knowledge" are actually advertising ecosystems whose algorithms reinforce sexist and racist biases rather than being impartial libraries. The algorithm was not reflecting an "objective reality" but rather reinforcing prevailing cultural and commercial biases when a search for "black girls" mainly yielded pornographic results, but a search for "white girls" did not. In the educational context, where students increasingly rely on these tools for their research, this means that their access to knowledge is mediated by systems that can actively distort their perception of reality and reinforce harmful biases.[33,34,35]

Algorithmic bias is not a hidden flaw in the code; its sources are known. It comes mainly from the training data, which reflects the historical biases of our society; from the design of the algorithm itself, which may unfairly weight certain factors; and from the use of proxies or substitute variables (such as zip code) that are strongly correlated with protected categories such as race or social class. Case studies on adaptive learning platforms have shown how these biases can harm students from marginalized groups, for example, by interpreting less interaction with the platform (due to a poorer internet connection) as lower ability, and consequently recommending lower-level material, trapping them in an inferior academic trajectory.[33,36] Mitigating these biases, as proposed by researchers such as Baker et al.[33], requires a comprehensive approach that goes beyond simply "cleaning" the data and addresses the very definition of "*fairness*" that the algorithm seeks to implement.

Discourses presented by the technology sector often portray bias as a technological "error" that can be solved with more data or better algorithms. However, O'Neil, Benjamin, and Noble reach a more radical conclusion: bias is predictable and systematic, not a system failure. Machine learning finds patterns in past data. An algorithm taught to "predict success" based on historical data on education, employment, and justice would codify and repeat those inequalities. This logic prioritizes prediction and efficiency over equality, allowing the system

to function as expected. The solution must be more than technical. It must be political and educational, questioning the criteria for "success" that we expect technology to maximize and valuing justice and injustice over automated efficiency.[37,38,39]

The Digital Divide and Technological Sovereignty

Discussing equity in education today typically focuses on the "digital divide," which refers to the disparity in access between those with devices and internet access and those without. Since the digital divide also encompasses disparities in skills, power, and cultural autonomy, a human-centered perspective must delve deeper. To enable communities to critically appropriate technology and adapt it to their own contexts and needs, the response must go beyond "connecting everyone." This is referred to as "technological sovereignty."[40,41,42]

The COVID-19 epidemic amplified the digital divide at its core. According to the OECD, Latin America lost the most hours of face-to-face teaching in the world, excluding millions of students from education. Both ECLAC and OEI studies have demonstrated this catastrophic effect and have called for urgent efforts to achieve universal access and establish more robust and inclusive hybrid learning models. First, close the access gap.[43,44]

This concept of technological sovereignty refers to a community, region, or nation's ability to control its own digital infrastructure, data, software, and the skills necessary for developing and maintaining them. Latin American authors such as Ceballos et al.[34] have analyzed how dependence on the platforms and infrastructure of a handful of global technology corporations constitutes a new form of "digital colonialism". In this model, data from users in the South is extracted and processed in the North. At the same time, the tools that shape communication, culture, and education are designed elsewhere, with different values and for different purposes. Achieving technological sovereignty, therefore, involves a conscious effort to develop local capacities, promote free and open-source software, create platforms that respond to specific cultural and linguistic needs, and establish public policies that protect data as a common good.

This struggle for technological sovereignty resonates deeply with Paulo Freire's critical pedagogy. In his *Pedagogy of the Oppressed*, Freire[11] criticizes "banking education," a model in which the educator "deposits" knowledge into the minds of passive students, nullifying their ability to think critically and transform their reality. Importing tools without critical analysis and massively implementing foreign educational innovations is akin to a "technological deposit." It does not allow teachers and students to co-create their own digital learning environment. Freireans view digital literacy as the acquisition of a critical awareness of who creates technologies, their interests, and their influence on culture and autonomy, rather than just how to use them. Thus, pursuing technological sovereignty in education is a pedagogical and political act of liberation that must be done to prevent digitization from becoming an instrument of oppression rather than a tool for building autonomous and emancipatory education.

Data Privacy and the "Quantified Self"

Digital platforms and AI systems will generate and collect enormous amounts of data on every learning process. They can record, store, and analyze every click, response, interaction, task duration, and eye movement pattern. The "datafication" of education offers unparalleled personalization, but it also introduces surveillance and raises significant concerns about privacy, autonomy, and the nature of the educational relationship. After creating a student's "quantified self" (a comprehensive digital profile of their strengths, weaknesses, and behaviors), we must develop robust ethical frameworks that extend beyond legal compliance and are grounded in the humanity of both the student and the teacher.[45,46]

The most significant risk is that educational institutions may unwittingly adopt the logic of "surveillance capitalism," a business model that uses personal data to predict and change human behavior for profit. It is often not obvious who owns, uses, and shares the data collected

by educational platforms.[31] This obscurity puts children and their families at risk. Aparicio-Gómez et al.[31] warn that the improper handling of data on academic performance, learning challenges, socio-emotional status, and disciplinary behavior could be used for discrimination in higher education and employment.

Students' perspectives are complicated, revealing anxiety and resignation in the qualitative study. Young people are increasingly concerned about their online privacy, but often feel powerless to regulate it or are uninformed about the extent of data collection by educational institutions and technology companies. According to the "privacy paradox," people claim to value their privacy but often violate it for the sake of convenience or minor rewards. Because they must take the course, students may accept a platform's terms and conditions without understanding them. Clearly, education on digital rights and transparency is needed.

Clear and legally enforceable ethical guidelines should govern the handling of educational data to mitigate these risks. Educational technology policies should follow the OAS data protection guidelines.[35] These include purpose limitation, data minimization, transparency, and informed consent. Data should only be collected for specific, explicit, and legitimate purposes and should not be processed in a manner that contradicts those purposes. However, legalistic or compliance-based approaches are inadequate. An ethics based on care should guide humane, sensible education. Feminist theorists inspired this method, which Cimenna Chao brought to education, placing connections, interdependence, empathy, and holistic well-being at the center of ethical discourse.[36] An ethics of care in data management goes beyond treating students as legal "data subjects." It sees the student as a whole person in development with vulnerabilities that must be protected. As trustees of their students' digital well-being, educational institutions are more than "data controllers" with legal duties. Does adopting technology or exploiting student data protect students? Does it promote autonomy, trust, and safe risk-taking? Does it monitor them, causing fear, conformity, and a reluctance to make mistakes? Empowering students with technology rather than quantifying and controlling them requires an ethic of care that prioritizes trust and educational connection over data extraction.

Competencies for an Uncertain Future: A Formative Itinerary

In an environment marked by the complexity, volatility, and ambiguity of the digital age, educational competencies must transcend the technical mastery of algorithmic tools and include metacognitive, socio-emotional, and ethical skills that enable learners to navigate the unexpected. According to Perkins[37], future wisdom involves not only knowledge applicable to new situations but also the ability to ask relevant questions, critically evaluate information, and collaborate to generate collective solutions in uncertain contexts.

Basic education (primary)

Building inquiry and emotional literacy should be the primary focus in the early years of school. Teaching students to identify assumptions in digital stories and multimedia information helps them develop critical thinking skills. Working on projects with other students helps them develop empathic communication skills by recognizing and valuing other points of view.[38] Activities that encourage metacognition help students learn for themselves. For example, they write down what they know and what they need to learn, using digital tools to track their progress and reflect on it.[12]

Secondary education

At this level, it is essential to develop systemic thinking so that young people understand the interdependence of social, environmental, and technological factors in global issues such as climate change or digital inequality.[10] Distributed collaboration is practiced in online research projects with peers from other countries, where they learn situational leadership and emotional

resilience in the face of cultural and communication gaps.[23] Likewise, social innovation is practiced by designing digital prototypes (apps, simulations) that respond to the needs of the local community, applying rapid testing and feedback cycles to iterate solutions.

Higher education and vocational training

In this context, a transdisciplinary approach is essential, as students and teachers integrate quantitative and qualitative methodologies to examine complex phenomena, utilizing AI as a co-researcher in the study of extensive datasets, while maintaining awareness of their social relevance.[39] Algorithmic ethics is explored through practical case studies, where future experts evaluate bias issues in facial recognition systems or automated recommendation algorithms, suggesting methods for transparency and accountability.[5] Ultimately, educational innovation environments enable individuals to develop into reflective leaders. In these environments, teams from various fields collaborate to develop and test innovative forms of learning, such as immersive virtual laboratories or co-creation pedagogies, always considering their impact on equity and human development.[48]

Graduation pathway

This educational path—from questioning literacy in elementary school to critical citizenship in high school to ethical-investigative agency at the university level—outlines a competency-based route that prepares individuals for an uncertain future. Each level provides students with a set of skills that, when combined with new technology, enable them to become independent, caring, and capable of critical thinking. This growth is guided by human-intelligent education, which uses AI to enhance human talents rather than replace them. It also ensures that the transition between levels increases meaning-making and social interaction for all.[49]

CONCLUSIONS

The socio-technical imaginaries of AI in education highlight a key point. Technological optimism and technological pessimism, which emphasize efficiency or oversight, distract from the mission of education. This chapter has suggested that the real issue is to create a pedagogical mission that leverages technology to enhance our special human abilities, not just to incorporate AI.

Revaluing emotional, social, and physiological cognition as the cornerstone of authentic human knowledge is necessary to move beyond a narrow, computational conception of intelligence. Thus, a "humanly intelligent education" fosters critical thinking, creativity, cooperation, and ethical literacy. Using active methods such as PBL and Socratic discourse, teachers become curators of experiences and ethical guides rather than transmitters.

This shift raises ethical questions. Due to "technological solutionism" and corporate agendas, these tools are adopted uncritically, threatening to deepen algorithmic biases, create new forms of digital colonialism, and normalize a culture of surveillance that commodifies the student experience.

A political and pedagogical commitment to technological sovereignty, ethical audits of algorithms, and the pedagogy of care are essential to creating a humanely intelligent future. Education must prioritize human agency, autonomy, and social justice over algorithmic efficiency.

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USE OF ARTIFICIAL INTELLIGENCE

We declare that artificial intelligence was used exclusively for linguistic review, academic style improvement, and textual consistency, without affecting the intellectual content or conclusions of the chapter.