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CHAPTER 20

ARTIFICIAL INTELLIGENCE AND THE REINVENTION OF EDUCATIONAL PRACTICES: BETWEEN TECHNOLOGIES, COMPETENCIES AND HUMAN FORMATION

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ABSTRACT
The growing presence of Artificial Intelligence (AI) in educational contexts has generated significant transformations in pedagogical practices, teaching-learning processes and knowledge production. Beyond the incorporation of new technological tools, AI challenges education to rethink pedagogical, curricular and ethical conceptions, particularly regarding the development of competencies and integral human formation. This chapter analyzes the reinvention of educational practices mediated by Artificial Intelligence, articulating digital technologies, educational competencies and ethical principles. Grounded in classical and contemporary authors in education, critical technology studies and sociology, as well as in formative guidelines on educational transformation, the text argues that the integration of AI in education must be guided by a critical, pedagogical and human-centered approach. It concludes that Artificial Intelligence can contribute to educational innovation when understood as a pedagogical means rather than an end, strengthening formative practices committed to intellectual autonomy, equity and social responsibility.

Keywords: Artificial Intelligence; Educational Practices; Competencies; Human Formation; Ethics.

INTRODUCTION

The intensification of the use of Artificial Intelligence (AI) in different spheres of social life has triggered profound transformations in the ways knowledge is produced, work is organized, social relations are mediated, and citizenship is exercised. In the educational field, these transformations are not limited to the incorporation of new technological tools; they imply a structural reconfiguration of pedagogical practices, of teaching-learning processes, and of the very role of the school in contemporary society. AI begins to act as cognitive, discursive and organizational mediation, directly affecting the ways of learning, assessing, producing meaning, and building formative trajectories.

This scenario demands that education move beyond instrumental readings of technology, often anchored in discourses of efficiency, innovation or modernization, and advance toward a critical, ethical and pedagogical understanding of AI's presence in educational contexts. As Selwyn (2019) and Holmes and Tuomi (2022) warn, intelligent technologies are not neutral: they carry values, rationalities and interests that must be interrogated in light of educational principles, human rights and the integral formation of subjects.

In this sense, the notion of educational competencies becomes central. As discussed by Perrenoud (1999) and Zabala (1998), and taken up in studies on educational transformation, competencies are not limited to technical skills; they involve the integrated mobilization of knowledge, attitudes, values and reflective capacities when faced with complex situations. The presence of AI in everyday school life intensifies this requirement, as it places educators and students before unprecedented challenges related to authorship, ethics, intellectual autonomy, information curation and living with algorithmic systems.

This chapter aims to analyze how Artificial Intelligence contributes to the reinvention of educational practices, articulating digital technologies, the development of competencies and human formation. It starts from the premise that pedagogical innovation mediated by AI is sustainable only when guided by ethical principles, by an expanded conception of competence, and by a critical view of education as a social, cultural and political practice. To that end, it engages in dialogue with classical and contemporary authors in education, sociology and critical technology studies, as well as with international guidelines and theoretical contributions present in the materials Competencies to Transform Education.

ARTIFICIAL INTELLIGENCE AND EDUCATIONAL TRANSFORMATION

The educational transformation associated with Artificial Intelligence is part of a broader context of the digitalization of social life, characterized by the massive circulation of data, the automation of processes, and the growing presence of algorithmic systems in decision-making. Castells (2018) names this scenario the network society, in which informational and technological flows reconfigure the relations among time, space and knowledge. In the educational sphere, this logic manifests itself in the

expansion of digital platforms, recommendation systems, virtual learning environments and tools for the analysis of educational data.

AI, unlike previous digital technologies, introduces the possibility of automated adaptation, personalized learning, and the prediction of educational behaviors. Systems based on algorithms are capable of analyzing performance patterns, identifying learning gaps, and suggesting individualized formative paths. This potential is often presented as a solution to historical problems in education, such as dropout, lack of motivation or learning difficulties. However, as Selwyn (2016) and O'Neil (2016) point out, such promises must be examined critically, as they may reinforce inequalities, oversimplify complex educational processes, and reduce learning to quantifiable metrics.

In the materials Competencies to Transform Education, technology is understood as a tool for educational transformation, provided it is integrated in a pedagogical, ethical and contextualized manner. Kenski (2012) emphasizes that technology must be understood as a means to achieve educational objectives, not as an end in itself. This assertion becomes even more relevant in the context of AI, where there is a risk of subordinating pedagogical practices to the logics of platforms and the commercial interests that sustain them.

Personalized teaching, often associated with AI, clearly illustrates this tension. Although it may favor more flexible and adaptive learning trajectories, it may also limit the educational experience to individualized paths, weakening collective, dialogical and critical dimensions of learning. Freire (1996) cautions that education cannot be reduced to the technical adaptation of the individual to the world; it must promote a critical reading of reality and the possibility of transforming it. Thus, algorithmic personalization must be challenged by pedagogical practices that value dialogue, problem-posing and the collective construction of knowledge.

Another central aspect of educational transformation mediated by AI is the redefinition of the teaching role. As discussed by Tardif (2002) and Moran (2000), the contemporary teacher ceases to be a mere transmitter of content to act as a mediator, curator and guide of learning processes. The presence of intelligent systems does not eliminate this function; on the contrary, it makes it more complex. It is the educator's role to interpret data, contextualize information, problematize automated responses and promote formative experiences that go beyond what algorithms can offer.

Moreover, educational transformation involves inescapable ethical and political dimensions. The massive collection of educational data, algorithmic surveillance, and the use of commercial platforms jeopardize principles such as privacy, autonomy and equity, as discussed in the e-books themselves when addressing the General Data Protection Law (LGPD) and the ethical challenges of technology in education. In this context, education must adopt a critical stance toward AI, forming subjects capable of

understanding, questioning and intervening in the technological logics that permeate their formative experiences.

EDUCATIONAL COMPETENCIES IN THE AGE OF ARTIFICIAL INTELLIGENCE

The emergence of Artificial Intelligence in the educational field intensifies the debate on which competencies are necessary to form subjects capable of acting critically in complex digital contexts. The notion of competence, as widely discussed by Perrenoud (1999), Zabala (1998) and taken up by Libâneo (2001), goes beyond the idea of technical mastery of tools; it involves the integrated mobilization of knowledge, skills and attitudes to address real and unprecedented situations. In the age of AI, this mobilization becomes even more demanding, as subjects begin to interact not only with information, but with algorithmic systems that produce, filter and organize meaning.

In the materials *Competencies to Transform Education*, the centrality of competencies is presented as a condition for effective educational transformation aligned with the demands of the 21st century. It is emphasized that digital literacy, pedagogical competence and socio-emotional competencies constitute inseparable axes of teacher and student formation. This understanding converges with the studies of Lankshear and Knobel (2011), who assert that contemporary literacies are configured as situated social practices, deeply permeated by digital technologies and new forms of cultural production.

In the context of AI, digital competence takes on an expanded dimension. It is not merely about knowing how to use platforms or applications, but about critically understanding how algorithmic systems function, what data they collect, what logics guide their responses, and what impacts they have on educational processes. Holmes and Tuomi (2022) argue that educational formation must include AI literacy, capable of promoting conceptual understanding, critical thinking and ethical responsibility in the use of these technologies.

Alongside technical and cognitive competencies, socio-emotional competencies gain prominence, widely discussed in the analyzed e-books. Del Prette and Del Prette (2005) and Tardif (2002) highlight that aspects such as empathy, emotional self-regulation, cooperation and relational ethics are fundamental for constructing meaningful learning environments, especially in contexts mediated by technologies. AI, by automating interactions and decisions, may weaken human dimensions of the educational process if it is not accompanied by pedagogical intentionality and teaching mediation.

Another fundamental axis is ethical competence. Living with intelligent systems demands that educators and students develop criteria to evaluate the reliability of information, recognize algorithmic biases and understand the limits of automation. Floridi (2018) proposes an ethics of information that recognizes human responsibility in the creation and use of digital systems. In the educational field, this

implies forming subjects capable of making conscious decisions, respecting principles of justice, equity and human dignity.

In this sense, competence cannot be understood as an isolated individual attribute, but as a social and pedagogical construction situated in institutional, cultural and political contexts. Competency-oriented education, especially in times of AI, requires flexible curricula, formative assessment practices and spaces for collective reflection, as advocated by Moran (2000) and Saviani (2007). It is about preparing subjects not only to operate technologies, but to understand them, question them and transform them in favor of emancipatory educational projects.

Table 1 – Educational Competencies Mobilized in the Integration of Artificial Intelligence

Dimension of Competence	Characterization in the context of AI	Main theoretical references
Critical digital competence	Understanding the functioning of algorithmic systems, critical reading of data, information discernment and conscious use of intelligent technologies	Perrenoud; Lankshear & Knobel; Holmes & Tuomi
Pedagogical competence	Ability to intentionally integrate AI into the curriculum, learning design, and active methodologies, preserving teacher mediation	Moran; Kenski; Valente
Socioemotional competence	Development of empathy, cooperation, emotional self-regulation, and relational ethics in technology-mediated environments	Del Prette & Del Prette; Tardif
Ethical competence	Critical evaluation of the impacts of AI, recognition of algorithmic biases, responsibility in the production and use of content and data	Floridi; Noble; O'Neil
Reflexive competence	Ability to problematize the presence of AI in education, articulating technology, human formation, and social commitment	Freire; Morin

Source: prepared by the authors, 2026.

REINVENTING EDUCATIONAL PRACTICES: LEARNING DESIGN, METHODOLOGIES AND AI

The incorporation of Artificial Intelligence into educational processes drives the reinvention of pedagogical practices, demanding new ways of planning, executing and assessing learning. This reinvention does not occur spontaneously or automatically; it requires pedagogical intentionality, theoretical grounding, and alignment with ethical and formative principles. The concept of learning design, widely discussed in the e-books Competencies to Transform Education, emerges as a central element in this process.

Innovative learning design presupposes the articulation among educational objectives, active methodologies, technological resources and formative assessment. As Kenski (2012) points out, pedagogical planning mediated by technologies must consider not only the technical potential of tools, but their effective contribution to knowledge construction. In the context of AI, this implies using intelligent systems to support learning, without replacing the teacher's role or reducing the complexity of the educational process.

Active methodologies, such as project-, problem- and challenge-based learning, gain new momentum when articulated with intelligent technologies. Valente (1999) and Moran (2000) argue that student protagonism is an essential condition for meaningful learning. AI can contribute to this protagonism by offering immediate feedback, simulations, adaptive environments and multimodal resources. However, these resources only become pedagogically relevant when inserted into proposals that value reflection, authorship and collaboration.

Authorship, in fact, becomes especially relevant in the reinvention of educational practices mediated by AI. Generative systems challenge traditional conceptions of textual production, creativity and assessment. Paveau (2021), in discussing technodiscursivity, points out that the production of meaning in the digital environment occurs in a distributed manner between humans and technical devices. In education, this demands rethinking assessment practices, recognizing technological co-authorship without relinquishing the student's intellectual and ethical responsibility.

Another fundamental aspect of learning design in the age of AI is assessment. The analyzed e-books emphasize the importance of formative, continuous assessment oriented by competencies. AI systems can assist in the collection and analysis of educational data, offering indicators of performance and engagement. However, as O'Neil (2016) and Selwyn (2019) caution, the uncritical use of metrics may reinforce inequalities and reduce learning to numbers. It is the educator's responsibility to interpret these data in light of the pedagogical context, avoiding automated decisions that disregard individual and collective trajectories.

The reinvention of educational practices also involves expanding the spaces and times of learning. Hybrid, virtual and collaborative environments become increasingly present, requiring new teacher competencies for pedagogical mediation. As highlighted in Competencies to Transform Education, the educator assumes the role of facilitator, guide and curator of learning experiences, promoting meaningful interactions even in contexts mediated by technologies.

Finally, it is essential to recognize that pedagogical innovation is not limited to the adoption of advanced technologies. As Freire (1996) emphasizes, transformative education is that which promotes critical consciousness and a commitment to social transformation. When integrated in a reflective and ethical way, AI can contribute to more inclusive, personalized and meaningful educational practices.

However, when guided by market or technocratic logics, it runs the risk of emptying education's formative sense.

ETHICAL DIMENSIONS OF ARTIFICIAL INTELLIGENCE IN EDUCATION

The incorporation of Artificial Intelligence into educational contexts imposes ethical challenges that go beyond the technical field and reach pedagogical, political and social dimensions. Education, as a social practice committed to human formation, cannot ignore the ethical impacts arising from the use of algorithmic systems in teaching, learning and assessment processes. As discussed by Floridi (2018), information ethics must guide the conception, use and regulation of digital technologies, especially in sensitive contexts such as education.

One of the main ethical challenges concerns the collection, storage and use of educational data. AI-based systems depend on large volumes of data to function, which implies constant monitoring of students' activities. In the analyzed e-books, this issue is addressed through discussions of privacy, information security and legislation, with emphasis on the General Data Protection Law (LGPD), which establishes fundamental principles for protecting the rights of educational subjects. However, the existence of legal frameworks does not, in itself, guarantee ethical practices; educators and institutions must develop competencies to interpret and apply these principles in everyday school life.

Another relevant ethical aspect concerns algorithmic biases. As Noble (2018) and O'Neil (2016) warn, algorithms are not neutral: they reproduce values, priorities and inequalities present in the data that feed them. In the educational field, this may result in unfair classifications, stigmatization of students and automated decisions that reinforce social exclusions. Competency-oriented education, as advocated by Perrenoud (1999) and Saviani (2007), demands contextualized and formative assessment, incompatible with purely automated models for judging performance.

Equity in access to technologies is also a central ethical challenge. Although AI is often presented as a solution for personalizing learning, its implementation may deepen existing inequalities, especially in contexts marked by socioeconomic disparities. Kenski (2012) and Valente (2005) emphasize that technological integration is transformative only when accompanied by public policies, adequate infrastructure and continuous teacher training. Without these conditions, AI risks becoming yet another factor of educational exclusion.

The ethical dimension of AI in education further involves the issue of intellectual autonomy and authorship. Generative systems challenge traditional conceptions of knowledge production, demanding that schools rethink criteria of authorship, originality and assessment. Paveau (2021) proposes understanding contemporary discursive production as techno-discursive, that is, resulting from the interaction between human subjects and technical devices. However, recognizing this co-authorship does

not mean abdicating the subject's ethical responsibility. On the contrary, it demands that education form students capable of reflecting critically on the use of AI, adopting an ethical and conscious stance toward technologies.

In this context, the educator's role is fundamental. As discussed in the e-books, the teacher acts as an ethical mediator, guiding choices, problematizing uses and promoting a responsible digital culture. Tardif (2002) emphasizes that teaching knowledge is constructed through the articulation of scientific, pedagogical and experiential knowledge. In the age of AI, this knowledge must also incorporate an ethical and political dimension, capable of confronting the challenges imposed by the automation and datafication of education.

FINAL CONSIDERATIONS: ARTIFICIAL INTELLIGENCE AS A MEANS, NOT AN END

The analysis developed throughout this chapter shows that Artificial Intelligence occupies an ambivalent place in contemporary education. On the one hand, it offers significant possibilities for personalizing learning, expanding access to knowledge and reinventing pedagogical practices. On the other hand, it imposes ethical, political and pedagogical challenges that demand critical reflection, responsible regulation and educational intentionality.

By articulating technologies, competencies and human formation, we have argued that the reinvention of educational practices mediated by AI cannot be guided by a technocratic or market logic. As Freire (1996) and Morin (2000) argue, education must remain committed to forming critical, autonomous subjects capable of intervening in reality. In this sense, AI must be understood as a pedagogical means, not as an end in itself.

The centrality of educational competencies proved fundamental to sustaining a critical integration of AI in education. Digital, pedagogical, socio-emotional and ethical competencies form an inseparable set necessary for educators and students to navigate consciously in complex algorithmic environments. The materials Competencies to Transform Education reinforce this perspective by highlighting the importance of continuous teacher training, innovative learning design, and competency-oriented formative assessment.

The reinvention of educational practices, therefore, is not limited to adopting AI-based tools; it involves a deeper transformation of the conceptions of teaching, learning and assessment. It demands flexible curricula, active methodologies, spaces for dialogue and an educational ethics committed to equity, privacy and human dignity. As Holmes and Tuomi (2022) stress, the future of education with AI depends less on technological advancement and more on the pedagogical and political choices that guide its use.

We conclude that Artificial Intelligence can contribute significantly to educational transformation, provided it is integrated into a pedagogical project that is critical, ethical and oriented toward human formation. It is incumbent upon education to take an active role in building this project, forming subjects capable not only of using intelligent technologies, but of understanding them, questioning them and placing them at the service of a more just, inclusive and socially committed education.

Table 2 – Main ethical challenges of Artificial Intelligence in the educational field

Ethical dimension	Central challenge	Pedagogical implications
Privacy and data	Collection, storage and massive use of educational data	Need for clear institutional policies, teacher training and critical reading of systems
Algorithmic biases	Reproduction of social and educational inequalities	Risk of stigmatization, unfair classifications and automated decisions
Equity of access	Inequality of infrastructure and technological training	Expansion of exclusions if there are no public policies and educational investment
Authorship and intellectual autonomy	Use of generative systems in academic and school production	Review of evaluative practices and strengthening of the student's ethical responsibility
Teacher mediation	Reduction of the teacher's role in the face of automation	Reaffirmation of the educator as a critical and ethical mediator

Source: prepared by the authors, 2026.

The discussion developed in this chapter allows us to affirm that Artificial Intelligence occupies an ambivalent place in contemporary education: while it expands pedagogical and organizational possibilities, it also intensifies ethical, political and formative tensions that cannot be ignored. AI may favor personalized pathways, the expansion of multimodal resources and access to broader informational repertoires, but it may also reinforce inequalities, naturalize control logics and reduce complex educational processes to performance metrics. Therefore, the reinvention of educational practices mediated by AI does not rest on the promise of technological efficiency, but on the pedagogical intentionality that guides its use, the clarity of formative objectives, and the centrality of teaching mediation.

By articulating technologies, competencies and human formation, it became evident that the presence of AI requires a shift from an instrumental focus to a critical and educational approach capable of interrogating the ways in which algorithmic systems produce selections, hierarchies and meanings.

This requirement converges with the understanding of competence as the integrated mobilization of knowledge, skills and attitudes when facing unprecedented situations—a perspective present in Perrenoud, Zabala and in contemporary approaches to educational transformation. In this horizon, digital competencies are not restricted to tool mastery; they include informational discernment, a critical reading of algorithmic environments, and ethical responsibility in the production and circulation of content. The materials Competencies to Transform Education reinforce this understanding by advocating pedagogical, ethical and contextualized integration of technologies, emphasizing continuous teacher training and a commitment to equity.

In this sense, reinventing educational practices also implies reconfiguring learning design and modes of assessment. Active methodologies, projects and collaborative approaches can be enhanced by intelligent systems, provided they do not substitute pedagogical dialogue or empty the human dimension of learning. Assessment, in turn, must remain formative and interpretive, preventing automated indicators from becoming decontextualized judgment criteria. The teacher, as indicated by Tardif and Moran, assumes an expanded role of curator, mediator and ethical guide precisely because AI's presence increases the complexity of pedagogical decisions and the need for critical contextualization.

We therefore conclude that Artificial Intelligence can contribute to educational transformation when understood as a pedagogical means and not as an end, subordinated to a formative project committed to intellectual autonomy, social justice and human dignity. In consonance with Freire and Morin, we reaffirm that education cannot be limited to technical adaptation; it must form critical subjects capable of intervening in the world, including in the technological architectures that organize contemporary life. Thus, integrating AI demands responsible institutional policies, continuous teacher training, explicit ethical criteria and pedagogical practices that preserve the public and humanizing sense of education, ensuring that technological advancement does not eclipse the school's central commitment: to form people, not merely to optimize processes.

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