SUPERVISION AND TEACHING IN EDUCATION: HISTORICAL DEVELOPMENT AND CONTEMPORARY TRANSFORMATION IN THE DIGITAL AGE

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ABSTRACT

This study examines the meeting of pedagogical thought and technological innovation, focusing on the role of artificial intelligence in the evolution of education and the necessary reconfiguration of pedagogical practice within the contemporary European context. From a historical perspective, education has always been a field of relationships and dialogue, with technology emerging in various periods as a tool for reorganization rather than a replacement of the human factor. The European history of education, shaped by successive socially and politically transformed environments, from the educational restructuring of the 19th century to the post-war period of European integration, highlights the ever-increasing significance of the pedagogical value of the human element alongside the integration of new technologies and tools.

Artificial intelligence, as a modern tool, is introduced in this context not as a substitute for the teacher but as a means of enhancing pedagogical work. Throughout European educational history, emphasis on humanistic values has remained central, with new technologies expected to highlight these values and reshape educational processes. The teacher, as facilitator and guide, bears the responsibility of ensuring that artificial intelligence does not distance the learning process from its humanistic core, but rather strengthens it, maintaining its connection to the values of respect, ethics, and democracy.

The study combines contemporary theoretical analyses with historical approaches to European educational reforms, emphasizing the timeless necessity of re-evaluating the concept of pedagogy. The digital age, as reflected in the European context, calls for reflection on the roles of the teacher and the student, who remain fundamental actors in the educational process despite the increasing use of technology.

Keywords: Pedagogical value, technological innovation, artificial intelligence, personalized teaching, supervision and teaching, digital teacher

1.0 INTRODUCTION

Throughout the history of the European educational system, the concepts of supervision and teaching have been established as pillars of pedagogical practice and have acquired particular significance in shaping the role of the educator. In the early stages of institutionalized education, supervision was closely associated with discipline, control, and the hierarchical

reproduction of knowledge, while teaching was primarily understood as the transmission of a fixed and externally defined body of knowledge. The link between education and the formation of unified national identities, as well as the perpetuation of dominant power structures, was reinforced with the establishment of national educational systems in the 19th century. Gellner (2009) and Green (1990) point out that education functioned as a tool for shaping a homogenized nation-state, enhancing the consciousness of common purpose and collective identity, while simultaneously reproducing social and political power relations, thereby securing the continuity of dominant political and social structures.

With the advances of the 20th century and the emergence of new learning theories, such as Vygotsky's (1978) theory emphasizing the importance of social interaction in knowledge development, and the experiential learning approaches of Dewey (1938) and Kolb (1984), supervision and teaching began to acquire more interactive and reflective characteristics. These shifts introduced sustained collaboration between teacher and student, along with elements that encouraged self-awareness and critical thinking in the learning process. Supervision gradually became decoupled from control and assumed a formative role, functioning as support, guidance, and accompaniment within the learning experience. Teaching was transformed from a tool of passive transmission into a dynamic process of meaning-making, in accordance with the principles of sociocultural learning and transformative education (Mezirow, 1991; Vygotsky & Cole, 1978).

As we enter the 21st century, educational practice faces new challenges arising from both digital acceleration and the rapid development of artificial intelligence. The needs of students and the skills required in a globalized and constantly evolving society have led to a redefinition of the educator's role as a designer of learning environments, with an emphasis on personalization and experiential learning. Under these new conditions, supervision and teaching are once again being redefined: supervision now extends beyond the student to include the artificial intelligence integrated into teaching, while instruction is increasingly carried out through algorithmic, personalized learning support systems (Luckin et al., 2016; Holmes et al., 2019). The educator becomes the critical agent who guides, monitors, optimizes, and infuses with ethical considerations the processes undertaken by digital media, transferring teaching from the traditional physical classroom into a connected network of learning.

Through this dynamic historical trajectory, the concept of pedagogical theory proves to be enduringly valuable. Although terms and technologies evolve, the core of the educational relationship, the dialectical interplay between knowledge, subject, and guidance, remains fundamental. Knowledge is not merely transmitted; it is actively co-constructed by the learner and the support they receive, a relationship that strengthens educational dialogue and fosters the learner's continual development. Herbart's ideas on the gradual cultivation of morality and judgment through well-structured, supervised instruction reemerge in new form in the 21st century's demands for reflective, active, and socially conscious citizens (Corral Granados, 2014; Biesta, 2011).

2.0 THE TRANSITION FROM THE AUTHORITARIAN MODEL TO COLLABORATIVE TEACHING

The role of the teacher has undergone substantial transformation over the centuries, as perceptions of knowledge, education, and the position of the student within the learning process

have evolved. In antiquity, particularly in ancient Greece, the teacher held an almost sacerdotal status, functioning as an authority who imparted wisdom and virtue to the student. The teaching relationship was grounded in the disciple's devotion to the instructor, exemplified in the Socratic dialogue, where questioning and the pursuit of reason were central to the process of education (Marrou, 1948).

During the Middle Ages, knowledge became enclosed within religious institutions, and education was monopolized by monasteries and university schools founded under the Church's auspices. The teacher assumed the role of guardian of revealed truth, and teaching was defined by the authoritative transmission of religious and theological knowledge (Le Goff, 2005). A strict hierarchy and the passive stance of the student toward the teacher's authority reflected an authoritarian teaching model, in which questioning had no place.

With the rise of the European Enlightenment and the establishment of nation-states between the 17th and 19th centuries, the educator assumed a new, multifaceted role: the teacher became both a bearer of rationality and an agent of state-led civic instruction. Education was organized as a public good under state supervision, and supervision emerged as a mechanism for quality control and compliance with national standards. Comenius (1657), in his Didactica Magna, contributed to the formulation of a rational pedagogical framework with strict structure and universal applicability, within which the teacher was expected to guide, supervise, and evaluate (Comenius, 1907).

The Industrial Revolution and the expansion of mass education reinforced the disciplinary model, wherein the teacher functioned more as a supervisor than as a facilitator. Teaching was organized according to the logic of the industrial factory, emphasizing efficiency, discipline, and the homogeneity of learning outcomes (Foucault, 1977; Bowles & Gintis, 1977). Supervision acquired a technical and administrative dimension, often acting as a mechanism that constrained pedagogical freedom.

However, with the transition into the 20th century, new educational movements emerged that challenged the authoritarian and monologic model. The New Education movement (Éducation Nouvelle), represented by thinkers such as Dewey (1938), Montessori (1912), and Freinet (1947), highlighted the importance of active student participation, free expression, and collaboration. The teacher's role was redefined: no longer an authoritarian figure, the teacher became a companion, facilitator, and designer of learning experiences. Teaching was transformed into a collective act of creation and reflection, grounded in experiential learning and dialogue with students (Dewey, 1938; Freinet, 1947).

The 20th century was marked by major educational shifts that reflected broader social, political, and scientific changes. The pedagogical developments of the period did not merely continue the rigid, authoritarian teaching model of previous centuries. On the contrary, they represented a significant turn toward a student-centered model that recognized the value of active participation, collaboration, and creativity in the educational process. Education moved away from the rigid systems of the past and embraced new pedagogical theories influenced by psychology, sociology, and the natural sciences. John Dewey (1938), as a leading figure of the progressive movement, argued that learning should be based on experience and student involvement. Rather than passively receiving knowledge, students engage in learning through action, inquiry, and collaboration. The school is transformed into a learning community, with

the teacher assuming the role of coordinator and facilitator of learning processes, as opposed to the traditional role of strict instructor and overseer.

Moreover, 20th-century pedagogical thinking was significantly shaped by Lev Vygotsky's sociocultural theory (1978), which emphasized the social dimension of learning. Vygotsky stressed the importance of negotiating knowledge through interaction between student and teacher, as well as among peers. The educational environment is not merely a site for knowledge transmission, but also a space for the construction of the learner's social and cultural identity.

The shift from strict teaching and supervision to collaborative teaching based on dialogue and student participation was also strengthened by the growing recognition of diversity in the learning space. Evolving perspectives on the needs of students with disabilities or from diverse cultural and social backgrounds have led to the acknowledgment of the necessity for individualized approaches and flexibility in the educational system (Tomlinson, 2001).

The foundations of collaborative teaching were further consolidated in the second half of the 20th century through the dissemination of theories such as Vygotsky's sociocultural approach (1978) and the enriched conception of the school as a learning community (Wenger, 1998). The educator now takes on the role of mediator, who coordinates, motivates, and facilitates interactions. Supervision is no longer about surveillance, but rather about supporting and reflectively monitoring the student's development, giving the educational process a dialogical and participatory character.

These pedagogical developments were deeply influenced by the social and political contexts of the 20th century. Educational reform became a vehicle for enhancing social mobility, promoting equality of opportunity, and adapting education to the emerging needs of industrial and post-industrial societies (Bowles & Gintis, 1977). Within this context, education was recognized as a key to fostering social cohesion and cultivating active citizenship, with the expansion of public education to the entire population.

The modern role of the teacher is shaped by these pedagogical developments and reflects ongoing social and technological changes. The 21st-century teacher is expected to assume multiple roles beyond the traditional function of knowledge mediator. Contemporary perspectives on learning, shared by both progressive theorists and scholars in educational technology, require the teacher to adopt a more active, student-centered stance.

In the modern classroom, the teacher is not merely a transmitter of knowledge but also the facilitator and guide of the learning process. Within the framework of collaborative teaching, the teacher encourages student participation by promoting group work, inquiry-based learning, and critical thinking. The school becomes a space where 21st-century skills such as collaboration, communication, creativity, and critical thinking are cultivated (Saavedra & Opfer, 2012).

Technological advancements, particularly the emergence of artificial intelligence, have also impacted on the teacher's role. Technology has provided new opportunities for personalized learning, with tools that adapt to the needs of each student. The teacher now assumes the role of a learning guide, contributing to the creation of an interactive learning environment that

integrates technological tools and enables students to learn in ways that suit their individual needs and paces (Hamilton, Rosenberg, & Akcaoglu, 2016).

Moreover, the contemporary teacher must be aware of the social and cultural contexts of their students to create an inclusive learning environment that addresses the needs of all learners, regardless of gender, social class, or cultural background (Banks, 2016). In today's educational landscape, embracing diversity is a core value, and teachers must be ready to adapt their methods to meet the needs of all students.

This transition toward more flexible, collaborative, and student-centered teaching highlights the multifaceted dimensions of the teacher's role and underscores the necessity for ongoing professional development and critical reflection on pedagogical practice.

3.0 THE EMERGENCE OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF EDUCATION

The integration of artificial intelligence (AI) into education in recent years marks a new era for the educational system, reflecting a continuous evolution from simple digital tools to personalized learning systems functioning as "digital teachers." The first phase of this transition was characterized by using tools that supported lesson presentation and instructional organization. Initially, digital tools such as educational software and platforms served to enhance learning by promoting student interaction with educational content. However, these tools remained limited in scope, as they could not adequately address the unique needs of individual learners (Baker & Siemens, 2014).

The emergence of AI in education brought significant progress in the personalization of learning, due to its capacity to analyze student data in real time and adjust the learning experience according to each learner's specific needs and preferences. Consequently, students are no longer bound to a static and standardized program but can progress according to their own performance and challenges. Adaptive algorithms enable the "digital teacher" to recommend personalized activities or provide targeted feedback to improve student understanding. Through assessment and data analysis, digital systems create a learning environment that dynamically adapts to each student (Woolf, 2008).

The transition from digital tool to "digital teacher" signifies a reshaping of the teacher's role. The use of AI opens new possibilities for the enhancement of instruction. Teachers are no longer confined to the role of content deliverers but assume responsibilities of guidance and supervision over learning processes that are facilitated and optimized through AI tools. Education now combines the human element with the capabilities of artificial intelligence, allowing teachers to focus on supporting students and ensuring that learning is as efficient as possible for everyone (Laurillard, 2012).

The "digital teacher" does not merely serve as a content delivery tool but integrates the entirety of a pedagogical strategy through its capacity for adaptation, feedback, and personalization. It can incorporate teaching strategies and methods tailored to the learning needs and capabilities of each student, aiming to foster personal development and academic success. This system enables students to engage with educational content at a deeper and more individualized level,

while the teacher oversees the process and provides guidance based on needs emerging from the use of AI (Seldon & Adiboye, 2018).

The presence of AI in education does not diminish the teacher's role; on the contrary, it enhances it by expanding the possibilities for personalized teaching and offering tools that support more flexible learning processes. The teacher assumes the role of guiding the "digital teacher," overseeing system implementation, and adjusting instructional strategies based on student progress and needs. As such, the educator's role is transformed into a continually evolving blend of human guidance and technological support (Philpott, 2014).

Personalized learning has become one of the most important and innovative aspects of contemporary educational practice, particularly with the integration of AI into the educational process. Technology's ability to tailor learning to the individual characteristics and needs of each student constitutes a fundamental shift in how we perceive teaching and learning. Personalized learning allows students to develop their skills at their own pace, leveraging technology to improve performance in real time. It equips teachers with tools to identify students' areas of weakness or difficulty and to design instructional programs that directly respond to these needs, thereby maximizing each learner's educational experience (Baker & Siemens, 2014).

The incorporation of AI reshapes the teacher's responsibilities, steering instruction toward new directions that demand reflection, technological expertise, and flexibility. Traditionally, the teacher was responsible for designing and implementing instruction for all students in a relatively uniform way, based on a single approach to learning and cognition. However, with personalized learning, teachers must take on a more complex and analytical role, not only as instructors but also as guides who influence and shape students' learning paths through digital tools. Modern learning mechanisms allow educators to track individual student progress in real time and to tailor their instruction to highly personalized levels. This requires teachers to remain constantly engaged with technology and to guide the learning process through data analysis provided by AI systems (Woolf, 2008).

Present-day technological applications empower teachers by offering a new level of control over the educational process, facilitating differentiated instruction. The "digital system" acts as an ally for both teacher and student, enhancing teachers' ability to focus on the most critical and individual needs of their learners. At the same time, educators must monitor student progress and adapt their strategies not only to meet the general needs of the class but also to address the specific needs of each student. The teacher's ability to use data and information to adapt educational content aims to improve learning outcomes and reduce achievement gaps (Laurillard, 2012).

Thus, much of the responsibility for education shifts from delivering general content to identifying and analyzing each student's specific needs. The teacher becomes the manager of the learning process and of student assessment, monitoring performance and guiding the use of technology in ways that support learning development. Teachers are no longer mere transmitters of knowledge but are now navigators of the learning journey, capable of recognizing individual student needs and directing learning in a personalized manner (Seldon & Adiboye, 2018).

The introduction of personalized learning supported by AI requires educators to remain constantly informed about emerging technologies and methods, while also preserving the human dimension of education. Technology is not intended to replace teachers but to enhance their role, enabling them to manage student diversity more effectively and efficiently. Personalized learning and AI integration bring the capabilities of technology into teaching practice, allowing educators to assume a more comprehensive and dynamic role within the educational process (Philpott, 2014).

4.0 SUPERVISION IN A NEW FRAMEWORK: HUMAN GUIDANCE OF ARTIFICIAL INTELLIGENCE

Supervision remains a fundamental pillar of the educational process, ensuring the quality and effectiveness of teaching and learning. In the age of the digital revolution, the concept of supervision enters a new framework, as the need emerges to define the ethical, pedagogical, and scientific boundaries of algorithmic oversight. Algorithmic supervision, which incorporates artificial intelligence to analyze and monitor the learning process, introduces new dynamics and challenges that demand a careful and multifaceted approach, given the responsibilities it entails.

Through dynamic analysis of learning data, modern algorithms identify progress patterns, enabling timely intervention and the adjustment of instructional paths. Their integration into education makes it possible to detect students' needs in real time and to immediately adapt educational content, thus allowing for a more personalized approach. However, the application of such systems raises several ethical and pedagogical concerns. Notably, issues of transparency and algorithmic interpretability may lead to complications, as educators and students may not fully understand how algorithmic outputs influence educational decisions. The teacher, as a central figure in the educational process, is called upon to oversee and interpret the recommendations generated by algorithmic systems, ensuring that technology is integrated in a way that is both effective and aligned with ethical principles (Selwyn, 2021).

The ethical dimension of algorithmic supervision also reveals the risk of discrimination and inequality in education. Algorithms used for student analysis are often based on datasets collected from previous generations or potentially biased sources. This may lead to the reinforcement or even exacerbation of existing educational disparities, perpetuating stereotypes and barriers that affect less privileged groups. Moreover, the risk of "digital surveillance" may arise, causing students to feel as though they are constantly monitored and that their personal development is not fully safeguarded from the systems in use (O'Neil, 2016). To avoid such outcomes, transparency in algorithms and the establishment of clear ethical standards are essential to ensure fairness and equity in learning processes.

Pedagogically, algorithmic supervision has the potential to alter the nature of the educational relationship. While artificial intelligence can provide accurate data on student progress, it cannot replace interpersonal interaction and human guidance, which remain vital for developing emotional and social skills. Algorithmic oversight must be integrated in ways that support the teacher's role in the human dimension of instruction, rather than replacing it. The collaboration between human and artificial agents must be grounded in communication and complementarity, not confrontation or dependence. This requires a clear separation between

the roles of AI and the educator, with the latter retaining ultimate responsibility for decisions affecting students (Celik, Dindar, Muukkonen, et al., 2022).

From a scientific perspective, the use of algorithms in supervising learning raises questions of reliability and validity. Algorithmic oversight depends on data, which may not capture the full scope of the learning process or reflect factors that influence student performance, such as emotional or psychological elements. The need for continual updating and reevaluation of algorithms is critical to ensure that the outcomes produced are objective and accurate. The scientific community is called upon to develop methods and models that guarantee the reliability of algorithms while accounting for the unique needs and diversity of learners involved in the educational process (Grant, 2022).

It is evident that algorithmic supervision and human guidance of artificial intelligence introduce new challenges to education that require the development of ethical, pedagogical, and scientific approaches. The teacher retains a central role in guiding students, while technology can enhance learning quality if integrated responsibly and transparently.

The educator's role as a regulator of educational technology constitutes a vital dimension in the development of contemporary educational practice. As technology continues to expand in education, through digital tools and AI, the teacher must assume a renewed role that goes beyond using such tools to include curating and guiding their implementation within the learning environment. As a "regulator," the teacher is responsible for integrating emerging technologies in ways that enhance learning without neglecting the significance of personal interaction and educational ethics (Williamson, 2017).

Technological development in education cannot yield positive outcomes without the guidance of the educator, who, beyond managing technological tools, acts as a curator of information and a responsible implementer of technological innovations grounded in educational integrity. In integrating technology into the classroom, the teacher must imbue it with a human-centered dimension, recognizing both the potentials and limitations of AI and other tools. Algorithmic suggestions or recommendations must be critically evaluated to ensure they serve meaningful learning and student development, rather than merely functioning as instruments of a rigid or potentially unjust educational system (Selwyn, 2021).

Furthermore, the teacher is tasked with aligning educational goals with technological capabilities. The continuous development of these tools does not automatically guarantee learning quality. Adapting technology to educational needs requires conscious reflection and pedagogical judgment by the teacher, who must connect technology with learning outcomes and ensure that education remains human and supportive for all learners (Cuban, 2013).

The capacity for personalized learning through technology and the growing trend of algorithmic supervision further underscore the teacher's role as a manager of technology. While AI systems can provide impressively precise analyses of learning needs, it is the teacher who evaluates the appropriateness and application of these tools for their students. Technology, like the algorithms that support it, cannot replace the importance of human judgment and the human element in education. The teacher is not merely a "technical" user of technology but its curator and guide, determining how and when it will be appropriately used to support the learning process (Grant, 2022).

As a regulator of educational technology, the teacher must also consider the ethical implications that arise from the use of digital tools and AI. Reliance on technologies that collect personal data can raise concerns about student privacy and data protection. Teachers must be aware of these challenges and assume responsibility for protecting students from the risks associated with excessive or inappropriate use of technology (O'Neil, 2016).

The need for continuous professional development in educational technology becomes apparent. As technologies evolve and are integrated into classrooms, teachers must stay informed about the latest developments and improve their skills in managing these tools. This involves not only the technical use of technology but also an understanding of the pedagogical theories underpinning education, to ensure that technology is integrated in ways that enhance learning and foster a supportive learning environment (Beetham & Sharpe, 2019).

As technology continues to evolve, the role of the teacher as a regulator of educational technology remains critical for ensuring learning quality. While algorithms and digital tools can support the learning process, the responsibility for preserving the humanistic dimension of education and ensuring proper application ultimately rests with the teacher. The interaction between technology and the educator must be grounded in balance and critical thinking, ensuring that technology serves as a supportive factor in student development, not as a substitute for the human relationships that are fundamental to learning.

5.0 TEACHING AS A MULTI-LAYERED RELATIONSHIP BETWEEN HUMAN, ARTIFICIAL INTELLIGENCE, AND STUDENT

The teaching process is undergoing a profound transformation with the integration of artificial intelligence (AI) into the school environment, not merely as a support tool, but as an active component of the instructional relationship. Teaching is no longer an exclusive interaction between human teacher and student; it is now embedded within a triadic structure, where AI mediates, interprets, processes, and at times co-constructs the learning environment. This multi-layered relationship does not introduce competition between its agents but highlights the dynamic of complementarity and the need to reassess what constitutes effective teaching and meaningful learning (Luckin, 2018).

The role of the teacher, in this context, expands to include the curation of cognitive processes shaped through technological mediation. AI can offer targeted personalization of instruction by analyzing student performance data and providing dynamic interventions or adapting cognitive stimuli. However, this capability does not replace pedagogical judgment, on the contrary, it intensifies its demands, as the teacher must interpret and evaluate not only the student's responses but also the "responses" of the machine to create a coherent and integrated learning experience (Holmes et al., 2022).

From the student's perspective, the coexistence with AI systems can enhance self-regulated learning through tools that provide feedback, adaptability, and autonomy over the pace and method of learning. Yet, its presence in the classroom reshapes the student's perception of what constitutes a "teacher," what "learning" means, and how "knowledge" is constructed. The student now enters a learning environment where authority is distributed rather than exclusively embodied, as digital systems lend technological credibility to educational content and its presentation (Baker, Smith, & Anissa, 2019).

Teaching in this new environment transforms into a collaborative construction, where the teacher is not replaced but rather operates as an intermediary or co-instructor, offering additional dimensions of understanding and multiple pathways to knowledge. The transformation is not limited to technological innovation in content or instructional media but reflects a redefinition of the very meaning of the relationship among participants. As a member of this relationship, AI demands from educators new cognitive and ethical competencies, and from students a cultivated digital literacy that allows for critical acceptance and responsible use of digital assistants (Selwyn, 2019).

The complementarity of roles becomes evident not only in the distribution of instructional responsibility but also in the flow of communication. While the machine can offer linguistic processing, pattern recognition, and needs analysis, the interpretation of emotions, the understanding of subjective experiences, and the anticipation of students' psychosocial fluctuations remain within the domain of the human teacher. Interaction within this multi-layered relationship is neither equal nor static, as it requires continuous shifts in roles and ongoing adjustments to maintain balance (Knox, 2020).

The concept of the "lesson" as a fundamental educational unit is reshaped by this. The notion of the "course" as a structural educational unit is reshaped through this tripartite dialogue. dialogue. The shift from lecture-based or traditional presentation to experiential, dialogical, personalized, and digitally supported learning signals a profound change in the pedagogical identity of teaching. The teacher, as regulator and mediator, not only selects technological tools but also orchestrates the coexistence of the three agents in a balanced and creative relationship that enhances learning, cultivates critical thinking, and respects human individuality.

Teaching is no longer confined to the physical classroom but is shaped within a broader spectrum of experiences that extend into the personal space of the student. Its entry into educational routines reinforces this dynamic shift, turning the home into not merely a place for study but an extension of structured instruction. Lessons are carried into the home through tools such as digital assistants, adaptive algorithms, and learning platforms that deliver personalized content, a condition that radically reshapes the notion of "instruction" and the daily reality of the learner (Mincu, 2012).

In the home environment, the educational experience expands through systems that monitor learning progress and offer individualized support. The student no longer engages exclusively with the teacher but also interacts with artificial "learning companions" who provide explanations, corrections, and alternative learning paths. This form of support must not be viewed as a substitute for human presence; rather, it makes that presence even more critical, requiring the teacher to supervise and regulate out-of-school learning in ways that ensure coherence, conceptual continuity, and pedagogical orientation (Luckin, 2018).

The teacher becomes a curator of the learning experience and a designer of frameworks that link technological data with the student's lived learning needs. Supervision extends beyond the time and space of the classroom, encompassing oversight and support for how the student interacts with technology in their private space. This expanded form of supervision raises questions about the right to disconnect from digital monitoring, the boundaries of school responsibility, and the new ethical relationships between parents, teachers, machines, and students (Holmes et al., 2022).

The relationship between AI and home-based learning necessitates new forms of support. On the one hand, AI empowers the student, enhancing self-regulation and autonomy. On the other hand, without coordinated guidance, it may exacerbate learning inequalities, whether due to differences in access to technological resources or the inability of certain households to support their use. Home-based instruction, as an extension of teaching, cannot be considered neutral. It requires structure, pedagogical direction, and intentional design to avoid becoming a form of passive content consumption (Selwyn, 2019).

When properly integrated, technology can create a flexible learning experience that adapts to the daily rhythm and individual needs of each child. This shift invites a reexamination of roles and relationships: the lesson no longer begins and ends at school but is interwoven with the student's personal life rhythm. The concepts of time and space as defining parameters of teaching are transformed, creating a learning space-time where child, machine, and teacher interact through fluid yet dynamic modes of participation and guidance (Knox, 2020).

Home-based instruction with technological support does not imply the replacement of teaching but rather its extension into previously non-scholarly domains. The home becomes a site of experimentation, creativity, and knowledge construction, where the teacher's presence is expressed indirectly through the structures and choices implemented. Technology makes this shift possible, but pedagogical responsibility for interpreting content and shaping learning objectives remains with the educator.

6.0 TIMELESS PEDAGOGICAL VALUE IN A NEW CORE

The introduction of artificial intelligence in education does not negate but rather highlights with renewed urgency the enduring value of the pedagogical principles that form the foundation of educational practice. In a constantly transforming digital world, the need for stable orientations and interpretative frameworks becomes imperative. Terms such as relationship, dialogue, guidance, trust, respect, and participation do not merely describe techniques or methodological choices, they constitute the ethical and existential core of education, gaining new depth within an ecosystem of technological coexistence (Biesta, 2021).

Classical pedagogical values are not sidelined by the rise of algorithms; on the contrary, the presence of technology demands their rearticulation. The concept of guidance, for instance, can no longer be understood as the unilateral transfer of knowledge. It must describe a complex mediation wherein the teacher regulates how the student interacts with digital systems, assuming a guiding, supportive, and encouraging role throughout the learning journey. Interaction is no longer solely physical, it is also digital, and its pedagogical character depends on the teacher's ability to discern meaning amid a context of information overload (Kress, 2010).

The relationship between teacher and student is transformed without being diminished. Interpersonal communication may migrate to digital environments, but the need for trust, recognition, and empathy remains intact. Artificial intelligence may detect behavioral patterns and suggest learning strategies, but it cannot replace the moral responsibility that a human bears toward another. The value of the teacher's presence, as a bearer of meaning, becomes even more critical in an environment where information is abundant, but understanding is scarce (Freire, 1996).

Emancipation is no longer conceived as liberation from the authority of the teacher, but as the acquisition of the ability to navigate a complex network of information in which the risk of technological manipulation is real. The pedagogical role is not about the mere transmission of data, but about the construction of a reflective and values-based framework for learning, one that fosters freedom, responsibility, and critical thinking (Giroux, 2020).

Equality as a pedagogical value also requires redefinition in a digital environment characterized by unequal conditions of access, digital literacy, and participation. The educator must account for social, cultural, and technological factors so that the educational process does not reproduce inequality but becomes an opportunity to deconstruct it. Traditional pedagogical concepts thus gain historical dynamism: they do not return unchanged but are reshaped within the conditions of the new ecosystem (Selwyn, 2019).

The concept of the lesson is redefined, not as a time-bound event, but as an open cognitive process extending beyond school into a network of interconnected experiences. Teaching is no longer limited to the content delivered; it assumes an ethical dimension through the relationships it builds, the practices it cultivates, and the opportunities it provides for personal, social, and intellectual development. Its timeless value lies precisely in its capacity to give meaning to the present without confining it, embedding it in historical continuity without assimilating it entirely into the past (Dewey, 1938; Sennett, 2009).

Teaching, as a meeting of people and ideas, retains its ethical character regardless of technological medium. Artificial intelligence, as both tool and condition, does not undermine pedagogical orientation. Rather, it reopens the fundamental question: What is educational? Who decides this? By what criteria? And under what conditions? Reflecting on traditional pedagogical concepts, not out of nostalgia but as a tool for theoretical resilience and social understanding, becomes a fundamental prerequisite for educational practice in the new digital ecosystem.

Preserving pedagogical essence within technological innovation is both a central challenge and a necessary condition for understanding education as a process historically and ethically structured. The integration of AI and digital environments into teaching cannot be separated from the foundational core of pedagogical thought, as shaped by thinkers from Comenius, Rousseau, and Pestalozzi to Freire, Dewey, and Illich. Pedagogical essence is not defined by method or medium, but by intention, relationship, and the forms of meaning-making that link teacher, student, and world.

Historically, pedagogical discourse has emphasized learning as a holistic process, one that goes beyond knowledge acquisition to constitute the individual as a subject of ethical and social action. Technological innovations have always played a role in educational transformation, from tablets and lithographs to audiovisual media and digital systems. What changes is the way in which technologies are embedded in learning and the educator's ability to preserve the value orientation of their practice (Cuban, 1986; Illich, 1971).

Innovation in education cannot be technocratic. The evaluation of technology must not be based on efficiency alone but on pedagogical adequacy on whether it enhances the learner's ability to understand, reflect, connect, and act responsibly. As a digital mediator, AI makes it more necessary than ever to refer to fundamental pedagogical values: personal engagement,

empathy, responsibility, reflection, and freedom. There is no neutral use of technology; every integration carries assumptions about the nature of knowledge, the social structure of education, and the student's position within it (Feenberg, 1991).

Educational technology must function as an extension of pedagogical capacities, not as a substitute for human relationships. Technology may help structure knowledge, analyze data, and personalize pathways, but it cannot interpret emotion, inspire, or express the existential dimensions of learning. Teaching remains a process of inspirational practice with cultural and ethical depth that goes beyond the mere functionality of digital tools (Biesta, 2021).

A historical perspective reveals that every technological shift has been accompanied by theoretical reflection on its pedagogical implications. Education is not modernized through the mere addition of innovations, but through the reformulation of its fundamental questions. Artificial intelligence compels the establishment of new forms of educational practice in which the teacher acts as guarantor of meaning, as overseer of the relationship between technology and value, and as a bearer of cultural depth and social memory (Friesen, 2011).

Pedagogical essence is preserved when innovation is understood as a capacity to reshape the meaning of teaching, not as a technological upgrade devoid of critical awareness. The pedagogical role is, above all, historical, as it links past and present and shapes the future not in terms of predictable outcomes, but through the intentional creation of meaning that enables conscious human coexistence. Within this horizon, artificial intelligence ceases to be an object of fear or idealization and becomes a tool for reinforcing educational essence, so long as the human remains the bearer of critical pedagogical intent.

7.0 CONCLUSIONS AND CRITICAL REVIEW

The meeting between pedagogical thought and technological innovation shaped over time within the framework of social, cultural, and scientific transformations, highlights the ongoing necessity to adapt the role of education in a continuously shifting social and technological landscape. Education, as an institution composed of relationships, meanings, and values, cannot be conceived independently of technological developments, but neither should it be subordinated to them as neutral instruments. Since teaching has always been a relational act, a dynamic process of interaction, trust, and creative uncertainty, rather than mere knowledge transfer or storage, the emergence of artificial intelligence in the school ecosystem foregrounds not the replacement of educational work but its multi-layered reconfiguration on cognitive, ethical, and cultural levels (Biesta, 2021; Selwyn, 2019; Holmes et al., 2022). The historical trajectory of education, from the exclusivity of scholarly instruction to the standardized methods of the industrial era, and from there to the fluidity of postmodern learning environments, underscores that any technological addition gains genuine significance only when embedded in a human-centered framework, serving to enhance the educational process rather than functioning as an autonomous technical innovation (Feenberg, 1991; Friesen, 2011). The critical question is not the introduction of new tools, but how these tools are integrated into the formation of a public learning space that promotes freedom, diversity, and democracy.

Core pedagogical values such as care, trust, recognition of difference, reflective learning, and responsibility in discourse are not marginalized with the integration of new technological tools.

Rather, they acquire renewed meaning and emerge with greater intensity as the educational environment evolves into more complex and decentralized forms of learning. These values, deeply rooted in the work of educators such as John Dewey, Paulo Freire, and Nel Noddings, form the foundation of education as a practice of political and ethical responsibility. Technology, under this view, does not offer an autonomous solution to pedagogical questions but generates new fields of inquiry, demanding consistent human guidance, critical vigilance, and ethical oversight (Friesen, 2011; Cuban, 1986; Noddings, 2005).

Thus, the teacher's role is no longer confined to knowledge mediation or transmission but expands dynamically to include the design, evaluation, and reflective integration of digital learning tools, especially those powered by AI. The pedagogical relationship is transformed into a complex ecosystem of influences, where the teacher acts not only as a knowledge bearer but also as a value moderator, an institutional guarantor of the child's experience, and a supervisor of the quality of interactions between technology and student (Selwyn, 2019; Holmes et al., 2022; Biesta, 2021). Fundamentally, pedagogical work assumes a dual mission: the continuous cultivation of the human element within technological experience, and the safeguarding of the learning process from sliding into technocratic forms of socialization.

The digital teacher whether in the form of a voice-based interface, a hologram, or an interactive platform constitutes an extension of human care, provided its development is embedded within a pedagogically sensitive framework guided by the classroom educator. While technological support does not replace human presence, it transforms how that presence is articulated within the learning experience. In this context, the notion of supervision acquires new meaning: it extends beyond monitoring student progress to include the critical observation of how AI interacts, interprets, selects, and intervenes (Luckin et al., 2016; Holmes et al., 2019). The educator assumes a dual role: animating the learning process and curating the rational use of technological mediation.

Teaching becomes a triadic relationship among human, artificial intelligence, and student which does not negate its pedagogical core but requires its reconfiguration within new structures of interaction. AI is not merely functional or supplementary; it shapes new forms of interaction, experience, and cognitive activation. The pedagogical framing of these relationships is critical, for without ethical supervision and reflective guidance from the educator, there is a genuine risk that technology may devolve into a mechanism for reproducing cognitive patterns devoid of empathy (Selwyn, 2021). The challenge, therefore, lies not only in integrating AI into schools, but primarily in preserving the human-centered orientation of educational practice within the new technological landscape.

The parallel presence of a digital educational assistant in the home, as an extension of the educational experience, expands learning into the child's personal space, enhancing personalized support and creating new opportunities for managing learning in a more immediate, everyday setting. However, this development is not neutral, it raises critical questions about how learning criteria are defined and the ethical parameters that shape the learning process. Who determines the evaluation criteria? What value systems and ideological frameworks underlie algorithm design? More specifically, how does AI interpret and understand students' pedagogical needs, especially when these children have yet to fully develop their moral and value systems, making them vulnerable to potential reductions or

oversimplifications arising from algorithmic logic (Williamson & Piattoeva, 2018; Andrejevic, 2020)?

Thus, technological supervision not only organizes the learning process but also embeds new dynamics of power and control. These new forms of power are not neutral, they may carry ideological underpinnings and reproduce value-laden assumptions that influence students' perceptions and behaviors, creating dynamics of social and cultural stratification. Whether the algorithms managing student learning will promote the values of freedom, equality, and autonomy, or instead perpetuate stereotypes and limit individual expression, constitutes one of the most pressing challenges today (Williamson, 2017).

With the presence of the digital educational assistant in the home, the boundary between public and private learning spaces becomes increasingly blurred, and the process of "invisible" control more pronounced. While the personalization of instruction is undoubtedly an advantage, the careful management of technological integration requires ongoing critical oversight from those responsible for pedagogical guidance, to prevent the dominance of narrow technological logics that lead to simplification and repetition.

The historical trajectory of education serves as a clear reminder that the educational field is, above all, a space of relationships and interactions. Interpersonal connection, the authentic presence of the teacher, the unpredictable nature of dialogue and error, as well as the power of example and encouragement, are indispensable components of the learning process. These elements, with their dynamism and human dimension, cannot be replicated or replaced by any technological environment, no matter how advanced (Biesta, 2011; Illich, 1971). The teacher does not merely mediate knowledge or guide AI, they assume responsibility for pedagogical judgment and moral guidance throughout the educational process. They serve as a point of reference, ensuring the alignment of technology with human needs, value systems, and social realities. Thus, the human presence remains essential for preserving the ethical dimension of learning, which requires not only critical thinking, but also emotional and social commitment.

The teacher's presence, as an organic link between technology and the learner, reinforces the importance of personal relationship and collaboration, both of which are foundational to development and education. Technology, as much as it enhances and facilitates the learning process, remains a tool that requires human guidance and pedagogical responsibility.

In this new learning ecosystem, pedagogy is not merely a bibliographic reference—it is continually renewed and strengthened. On the contrary, it must affirm its timelessness through critical reassessment and reinterpretation of its traditional concepts. In the evolving educational landscape, the teacher is not merely a mediator of knowledge but also an enabler of technology, guiding students toward discovery, critical thinking, and creative interaction with digital tools. The student, in turn, becomes a co-creator of their learning environment, assuming an active role in shaping and adapting learning processes to their needs and aspirations. Teaching, therefore, becomes a process of reflection and self-awareness, a space in which we examine our relationship with knowledge, technology, and, above all, with one another. The concept of interaction is broadened, transforming learning into a pursuit of coexistence and cooperation, moving away from rigid role distinctions between teacher and student (Biesta, 2021; Kitchin, 2016).

The human being, as the guardian of pedagogical values, now faces a profound challenge: to assume responsibility not only for managing technological developments but also for determining how they are integrated into the world of learning. If artificial intelligence can offer new possibilities, its true value will be judged by humanity's ability to shape and use it with respect for human dignity and the social dimension of knowledge. Pedagogical thought, with its rich legacy, does not reject innovation. On the contrary, it transforms and adapts it in ways that ensure knowledge and learning remain authentic and human centered. Ultimately, real progress will come when technology serves the human, enhancing learning without estranging it from its essence.

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