A TEACHER TRAINING MODEL FOR THE AGE OF AI: INTEGRATING CRITICAL USE AND RELATIONAL COMPETENCES

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ABSTRACT
The widespread adoption of AI in educational contexts is generating resistance among teaching staff, also linked to fears of professional replacement. This reflection interprets this phenomenon as an expression of different conceptions of teaching: transmissive and relational. The contribution proposes an innovative theoretical teacher training model grounded in the integration of critical AI use and the development of non-substitutable competences: the embodied dimension of the educational relationship, non-verbal communication, a bio-psycho-social perspective, an ecosystemic reading, professional collaboration and reflective practice. Here, AI supports observation, instructional design, and communication practices, while interpretive, ethical and relational functions remain the responsibility of the teacher. The model promotes a form of digital affective literacy in which AI acts as an amplifier of the educational relationship, without assuming its constitutive functions.

KEYWORDS
Artificial Intelligence in Education; Teacher Training Model; Relational Competences.

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1. Introduction

The rapid spread of artificial intelligence in educational settings is bringing about significant changes in teaching practices, learning processes, and the design of educational environments (European Commission [EC], 2022; UNESCO, 2023). In particular, the development of generative systems and AI-based tools has expanded opportunities to support teaching by facilitating the creation of educational materials, the personalisation of learning, the simplification of content and communication (Hopcan et al., 2023; Hwang et al., 2020).

Alongside these opportunities, however, important questions have emerged regarding the changing role of teachers and the integration of artificial intelligence into educational contexts (OECD & EC, 2026; UNESCO, 2024). Although the current debate is largely focused on AI literacy programmes centred on technical aspects, an exclusively instrumental approach to artificial intelligence risks overlooking its pedagogical implications, particularly with regard to the educational relationship (Isma'il & Ibrahim, 2025; Nazaretsky et al., 2022).

In light of these considerations, this paper interprets teachers' reactions to AI as expressions of how they understand and enact their professional role. The article also presents a theoretical model of teacher professional development that integrates AI literacy with professional competences considered central to educational practice. From this perspective, artificial intelligence is conceived as a tool that supports teaching practice rather than replacing the educational relationship or the teacher's professional responsibility.

2. Artificial Intelligence, teaching professionalism and educational complexity

The development of the theoretical framework draws on a narrative review of the literature (Ghirotto, 2020; Popay et al., 2006). The analysis, organised by thematic areas, has enabled the construction of an interpretative framework for the subject matter of the work presented here. This approach does not aim for the comprehensiveness typical of systematic reviews, but rather brings together contributions from different disciplinary perspectives.

2.1. Conceptions of teaching and attitudes towards AI

The introduction of artificial intelligence into educational contexts has prompted diverse reactions among education professionals. Alongside perspectives that emphasise its potential to support teaching and personalise learning, concerns have emerged regarding possible changes to the teacher's role (Alwaqdani, 2024; Nazaretsky et al., 2022). The literature suggests that these differences cannot be explained solely by teachers' technological competence or digital literacy, but also reflect their pedagogical beliefs and conceptions of teacher professionalism (Cabero-Almenara et al., 2024; Choi et al., 2022).

Several studies suggest that the introduction of artificial intelligence may lead teachers to perceive a loss of professional autonomy and a redefinition of their role (Isma'il & Ibrahim, 2025; Puja et al., 2025). These reactions appear to depend not only on the capabilities of generative systems, but also on teachers' implicit conceptions of teaching, through which they interpret the aims and school's purposes (Giganti, 2025). From this perspective, some studies distinguish between transmissive approaches centred on subject content and relational or constructivist approaches that prioritise educational relationships and the development of socio-emotional competences (Cabero-Almenara et al., 2024; Chan & Tsi, 2024). Teachers who view content transmission as their primary professional responsibility tend to express greater resistance to, or concern about, AI, as it is sometimes perceived as a potential substitute for functions traditionally associated with teaching (Chan & Tsi, 2024; Latif, 2025). Conversely, teachers adopting a more relational or constructivist perspective tend to regard AI as a tool that can support learning and personalisation without replacing the interpretative, ethical and decision-making responsibilities of the teacher (Cabero-Almenara et al., 2024; Isma'il & Ibrahim, 2025).

2.2. The educational relationship beyond the content transmission

Whilst certain activities traditionally associated with the teaching profession – such as searching for information, producing materials, or organising content – can now be supported by intelligent systems, it is necessary to consider which aspects of educational practice require the teacher's presence in order to be carried out effectively. Teaching cannot therefore be understood as a process reducible solely to the transmission of knowledge, but rather as a situated relational practice

constructed through the interaction between people, contexts, and experiences (Carnero, 2023).

School is a context in which learning emerges through processes that simultaneously engage cognitive, embodied, emotional, and social dimensions. Accordingly, the body is not a secondary element of learning but a fundamental dimension through which individuals experience, interpret, and make sense of the world (Macedonia, 2019; Varela et al., 1991). The educational relationship also develops through embodied and often implicit forms of communication, including eye contact, posture, proxemics, facial expressions, silences, and modes of shared presence (Tabacchi, 2023). These dimensions play a central role in shaping the educational climate and in understanding pupils' experiences. Embodied relational competences therefore represent a core dimension of teaching practice, enabling teachers to interpret verbal and non-verbal communicative cues, make sense of contextual situations, and build meaningful educational relationships. Understanding educational contexts likewise requires processes of situated observation and interpretation that can rarely be reduced to standardised procedures. The same behavioural manifestations may assume different meanings depending on individual histories, group relationships, and contextual conditions (Maccario, 2024). Educational practice therefore requires the ability to attribute meaning to situations while simultaneously considering multiple levels of interpretation.

For support teachers, it is particularly important to adopt a perspective that understands individual functioning as the outcome of the dynamic interaction between biological, psychological, and social factors (WHO, 2001). Within this perspective, educational needs, participation, and learning are understood not as characteristics attributable solely to the individual, but as processes shaped by interpersonal relationships and environmental conditions. Such an approach helps to reduce the risk of interpreting educational processes exclusively in terms of performance and quantitative indicators (Fabiano, 2023).

This bio-psycho-social perspective is closely connected to an ecosystemic understanding of human development and education, according to which learning and participation emerge through the interaction of multiple interpersonal and contextual systems (Bronfenbrenner, 1979; Bronfenbrenner & Morris, 2006; Esteban-Guitart et al., 2024). From this perspective, schools are not isolated environments but relational nodes embedded within broader networks that include families, services, local communities, and wider socio-cultural contexts. Teachers are therefore required to develop competences that enable them to

understand the complexity and interdependence characterising educational contexts.

These perspectives also emphasise the central importance of collaboration with families and external specialists beyond the school. In particular, the development of inclusive pathways requires the involvement of multiple educational stakeholders and the establishment of partnerships based on dialogue, mediation, and shared responsibility (Dusi, 2022). For support teachers, such collaboration assumes a structural role, encompassing coordination activities, the shared interpretation of educational situations, and the joint planning of inclusive educational programmes (Artusi & Laccone, 2025). Within these increasingly complex dynamics (Morin, 2017), reflective practice likewise becomes a fundamental professional competence, understood as the capacity to critically examine one's own actions, reconsider educational decisions, and attribute meaning to professional experience (Artusi & Laccone, 2025; Schön, 1983). Reflection should not be understood as the abstract evaluation of educational situations, but as an ongoing process of critically examining one's own assumptions, representations, and ways of building relationships with pupils, families, colleagues, and external specialists.

Taken together, these considerations suggest that teacher professionalism includes relational, interpretative, and situated judgement that cannot easily be reduced to fully standardised or automated processes. The dimensions discussed here do not claim to exhaust the complexity of educational practice (Collet-Sabé & Soldevila-Pérez, 2026; Lopes et al., 2024; Yurevna, 2026). Rather, they identify theoretical dimensions that are particularly relevant for understanding the relationship between teaching, education, special education (Canevaro & Ianes, 2024; Pavone, 2010), and artificial intelligence (Harkins-Brown et al., 2025). Nor are these competences presented as domains in which AI cannot provide meaningful support. Instead, they identify aspects of educational practice in which the teacher's presence and professional judgement remain indispensable because they are grounded in contextual, embodied, ethical, and relational dimensions. This perspective highlights the importance of situating AI within a broad conception of teaching, in which technological tools function as supports for educational practice rather than assuming its constitutive functions.

3. An integrated theoretical model of teacher training in the age of AI

The reflections presented suggest that the integration of artificial intelligence into educational contexts requires teacher training that is not limited to the acquisition of technical and operational skills, but also takes into account the interpretative and contextual complexity that characterises educational practice (OECD & EC, 2026; UNESCO, 2024). From this perspective, we propose an integrated theoretical model of teacher training for the AI era, based on the integration of AI literacy and the development of competences considered central to educational practice.

A first function concerns support for observation processes (Kaptan et al., 2025; Tsybuliak, 2019). In educational settings, it is not only verbal content that is significant, but also non-verbal and embodied elements, such as silences, glances, postures, emotional expressions, and modes of participation (Magri & von Jacobi, 1998; Visceglia, 2023). From this perspective, AI can help broaden teachers' awareness of their own practice by analysing both verbal communicative dimensions (such as speaking time, interruptions, and types of questions) and non-verbal aspects (such as interactions, emotional expressions, and classroom management strategies). Wen (2026), for example, describes an AI-assisted observation system capable of collecting video data, anonymising it, recognising patterns related to teacher-child interactions, emotional changes, and classroom management, and providing feedback almost in real time. However, the same paper highlights significant risks relating to the danger that assessment might become excessively mechanical. For this reason, the teacher's role remains central: AI can generate data, identify patterns, and suggest avenues for reflection, but it is the teacher's interpretative, relational, ethical, and contextual competences that enable them to attribute meaning to this information, recognise implicit signs of distress or engagement, and responsibly guide educational practice.

A second function relates to support for curriculum design, particularly in the field of special education. AI holds considerable potential for creating more inclusive learning environments that are consistent with the principles of Universal Design for Learning (Gordon, 2024; Meyer et al., 2014; McMahon & Walker, 2019). For example, generative tools such as Large Language Models (LLMs) can support the creation of differentiated activities or the simplification of texts; applications such as Diffit allow materials to be adapted to different levels of complexity; and tools such as SymboTalk can support augmentative and alternative communication processes (Hopcan et al., 2023; McMahon & Firestone, 2024). These tools make it possible to rapidly expand the range of available teaching options. However, the selection of educational strategies requires a situated understanding of the

individual, their characteristics, their needs, and the relational context in which they are embedded.

From an ecosystemic perspective, artificial intelligence can support the interpretation of complexity by facilitating the organisation, integration, and representation of information from multiple individuals, services, and contexts. Indeed, the literature on systems thinking and network analysis highlights how representing relationships between different actors, processes, and resources fosters a more nuanced understanding of interdependencies, critical nodes and opportunities for coordination within educational systems (Candia et al., 2025; Gamede, 2025). From this perspective, knowledge management tools such as Notion integrate AI functionalities to organise, classify, and synthesise information from different sources, supporting the construction of shared knowledge bases and the consultation of large amounts of data. Similarly, visual collaboration environments such as Miro allow AI to generate concept maps, automatically group content, and represent collaborative processes. Meanwhile, systems mapping platforms such as Kumu enable the visualisation of networks of relationships between actors, services, and resources, making interdependencies and critical points within educational environments more transparent. Taken together, these tools can support processes of reflection, design, and educational governance, expanding the capacity to interpret complex systems through the integration of professional expertise and artificial intelligence. However, this support does not replace the management of interpersonal dynamics, which entails processes of negotiation, trust-building, and shared responsibility (Dusi, 2022; Esteban-Guitart et al., 2024).

AI can also support collaboration between colleagues. Tools such as Microsoft Copilot or Fireflies.ai enable, for example, the automatic production of meeting summaries, the documentation of shared decisions, and the tracking of issues emerging during teamwork. Similarly, collaborative writing environments such as Google Docs can facilitate the joint creation of documents and plans. Such tools can support the shared documentation of activities, promote continuity of information among group members, and facilitate operational coordination (Asthana et al., 2025). In the case of collaborative writing, they can also facilitate the joint drafting of documents, whilst leaving individuals responsible for interpreting situations, negotiating meanings, building consensus, and making decisions (Yukita et al., 2025). Professional collaboration, in fact, involves comparing different perspectives, managing differences, and constructing shared meanings, processes that require relational interaction among those involved (Hargreaves, 2019).

A further function relates to support for reflective processes. Generative tools such as LLMs can facilitate the analysis of logbooks, identify recurring patterns in educational practice, and suggest guiding questions for reflecting on professional experience (Abidi et al., 2024; Hofmann et al., 2025). These possibilities can foster critical reflection and increase awareness of one's own actions. However, reflectivity involves taking responsibility, reviewing one's educational choices, and attributing meaning to one's own experience. It therefore retains an ethical and experiential dimension that cannot be delegated.

Finally, AI can support communication with families, helping to make it more accessible and understandable. Large Language Models (LLMs) can assist in rephrasing messages, whilst tools such as DeepL can facilitate multilingual translation, and applications such as Grammarly can support linguistic editing and the adaptation of communicative tone. These features can help improve the clarity of communication and reduce certain language barriers, thereby broadening the possibilities for accessible communication with families (Pavlova, 2024; Xu et al., 2024; Yan et al., 2024). However, building relationships requires active listening, emotional management, and the development of mutual trust (Zanfroni & Maggiolini, 2024). AI can support communication, but it cannot replace human and professional interaction.

4. Critical reflections on the proposed model

The proposed integrated model forms part of the debate on teacher training in the age of artificial intelligence (Kohout-Diaz, 2026; UNESCO, 2024), based on the assumption that the introduction of AI into educational contexts requires competences that extend beyond the purely technological dimension. Recent research on AI literacy shows, in fact, that knowledge of AI tools is a necessary condition for their informed use, contributing to the development of trust, practical competences, and critical thinking regarding emerging technologies (Nazaretsky et al., 2022; Hur, 2025). Similarly, training experiences based on hands-on workshops and reflective processes appear to foster more informed attitudes and lower levels of resistance towards the use of AI (Hur, 2025; Taddei et al., 2025). Whilst recognising the central importance of these aspects, this paper focuses on a different dimension. The proposed model does not seek to downplay the importance of technical training related to the use of AI tools and the development of AI literacy, which is considered fundamental for the responsible use of emerging technologies (EC, 2022; UNESCO, 2023). Rather, it assumes that teacher training

cannot be limited to the acquisition of technical skills alone, but requires the integration of relational, interpretative, and ecosystemic dimensions, which constitute central aspects of educational professionalism.

However, a critical analysis also requires consideration of a number of problematic issues. One key concern relates to the risk that the introduction of AI may generate new forms of inequality associated with access to technology, levels of digital literacy, or the availability of resources across different educational contexts (Crompton et al., 2022; Lu & Li, 2025). Added to this are issues relating to algorithmic bias, the use of personal data, and the possibility that automated systems may reinforce pre-existing stereotypes or discriminatory mechanisms (Hacker, 2018; Huang, 2023). These aspects are particularly relevant in education, especially in the field of special pedagogy, where processes of classification and personalisation may contribute either to expanding or to limiting opportunities for participation and inclusion (Hopcan et al., 2023). Further concerns relate to the progressive delegation to technology of processes that have traditionally fallen within the teacher's professional responsibilities. Indeed, some authors point to the possibility that an excessively automated use of digital tools may foster a gradual loss of competences, reducing opportunities for observation, planning, and professional reflection (Nazaretsky et al., 2022; Puja et al., 2025). At the same time, a technology-centred perspective could shift attention away from educational relationships towards the efficiency of tools or technical performance (Selwyn, 2019). These risks suggest the need to maintain a balanced stance towards emerging technologies, avoiding interpretations that attribute to AI either a salvific role or one that replaces educational processes (Humble & Mozelius, 2022).

The proposed integrated model is not immune to such tensions. However, some of the theoretical choices underpinning it may be understood as attempts to mitigate them. The risk of a gradual delegation of professional responsibility is countered by the very structure of the model, which does not assign interpretative, relational, or decision-making functions to AI, but explicitly positions it as an amplifier of processes that remain subject to the teacher's judgement. The risk of technocentrism is addressed through the structural integration of AI literacy and situated professional competences, thereby preventing mastery of AI tools from becoming the sole focus of teacher training (Hur, 2025; Kohout-Diaz, 2026). Issues relating to algorithmic bias and inequalities of access (Crompton et al., 2022; Hacker, 2018; Lu & Li, 2025) are not, however, directly addressed by the model, which operates at the level of professional training rather than AI governance. Taken together, these choices outline a conception of teacher training in which

technological competence is valuable only when integrated with the ability to interpret situations critically, assume professional responsibility, and preserve the centrality of the educational relationship.

From this perspective, the integration of technological competences and pedagogical sensitivity could be interpreted as an emerging form of digital affective literacy (Tekeli, 2026) within educational contexts, understood as the ability to use digital tools whilst remaining attentive to the emotional and ethical dimensions that characterise teaching. Rather than representing an additional technical competence, this may be regarded as a professional orientation through which teachers integrate the critical use of technology, relational awareness, and pedagogical responsibility. The aim of teacher training is therefore not to prepare teachers to compete with AI, but to develop professionals who are able to integrate it critically into their practice whilst continuing to fulfil roles that require interpretation, responsibility, and the construction of meaning in relationships with pupils.

5. Conclusions

This paper has proposed a pedagogical interpretation of the relationship between artificial intelligence and teacher professionalism, based on the assumption that teachers' attitudes towards AI reflect not only their level of technological competence, but also their implicit conceptions of teaching and the educational relationship (Cabero-Almenara et al., 2024; Choi et al., 2022; Isma'il & Ibrahim, 2025). On this basis, a theoretical model has been developed that integrates AI literacy (Nazaretsky et al., 2022; Hur, 2025) with situated professional competences – relational, interpretative, and ecosystemic (Bronfenbrenner, 1979; Esteban-Guitart et al., 2024; Schön, 1983) – positioning artificial intelligence as a tool that supports educational practice without attributing to it functions that are constitutive of pedagogical judgement (EC, 2022; UNESCO, 2023, 2024). This approach appears to be particularly relevant in the field of special education, where the relational and contextual complexity of educational processes makes the professional's role central to interpreting situations, building alliances, and supporting inclusive pathways (Canevaro & Ianes, 2024; Hopcan et al., 2023; Pavone, 2010).

The model remains theoretical and conceptual in nature and requires further empirical testing. Future research may operationalise its constructs by developing training programmes and assessment tools and analysing their effects on the

development of AI literacy (Nazaretsky et al., 2022), inclusive practices (Harkins-Brown et al., 2025; McMahon & Firestone, 2024), professional collaboration (Hargreaves, 2019; Yukita et al., 2025), and teachers' representations of their own professional identity (Isma'il & Ibrahim, 2025; Kohout-Diaz, 2026). Within this framework, training experiences based on workshop-based, collaborative, and situated practices appear to foster more informed attitudes towards emerging technologies (Hur, 2025; Taddei et al., 2025) and could provide a valuable context for the empirical testing of the proposed model.

A particularly promising avenue for future research concerns the construct of digital affective literacy (Tekeli, 2026), reinterpreted here in the context of teacher training as a professional orientation capable of integrating the critical use of artificial intelligence whilst remaining attentive to the relational and ethical dimensions of teaching. Exploring this construct in greater depth could help define more precisely the conditions under which AI becomes an amplifier of educational action (Humble & Mozelius, 2022; Selwyn, 2019) rather than a substitute for it. In this context, what is at stake is not competition between teachers and machines, but the development of a teaching profession capable of navigating complexity critically (Morin, 2017) without losing sight of what remains irreducible in the school context: the educational relationship and pedagogical responsibility.

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