BEYOND TECHNICAL EXPERTISE: UNDERSTANDING THE RELATIONSHIP BETWEEN TEACHERS AND ARTIFICIAL INTELLIGENCE THROUGH THE ARISE-AI FRAMEWORK

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ABSTRACT

he spread of generative AI in education is redefining how knowledge is produced, mediated and validated, raising questions about teachers' interaction with these technologies. Against this background, the CREDDI group at eCampus University developed the ARISE-AI framework, a human-centred theoretical model for analysing teacher-AI relationships in socio-educational and training contexts.Based on questionnaire data from over 5,000 curricular and support teachers, this study examines AI growth potential by comparing current and expected future adoption. Findings show that the greatest potential for intervention lies among teachers with low to medium-low current use, where growth margins are highest. Overall, increasing AI adoption requires skills development and actions strengthening perceived usefulness, trust, motivation, and readiness to integrate AI into teaching and inclusive practices.

KEYWORDS

Artificial Intelligence; Generative AI; AI Literacy; Support teachers; Inclusive teaching.

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1. Introduction

The introduction of Artificial Intelligence (AI) into the social and educational context is not limited to a question of technological tools but involves a profound transformation of governance structures and everyday practices, including professional ones (Accoto, 2024). This process, already underway within what van Dijck and colleagues (2018) have defined as the platform society, is having a strong impact on multiple levels. At the narrative level, devices such as ChatGPT, Gemini and Midjourney have simultaneously generated both widespread consensus on their disruptive potential and public debate on their potentially disastrous consequences. One example is the discussion on how AI is transforming entire sectors of work, with the risk of job losses and the need to redefine professional skills. At the governance level, digital technologies based on algorithmic functioning are integrating with forms of centralisation of strategic services (e.g. health, social, educational, etc.) that create information flows managed and regulated mainly by the digital market (Dunleavy & Margetts, 2025). In this regard, the integration of AI in education has been strongly influenced by economic and market factors, with EdTech industry players providing AI services that directly influence practices (Williamson et al., 2023). At the micro level, research investigating the practices of individuals and their respective contexts (e.g., training organisations, non-profit enterprises, social cooperatives) often emphasise the risks associated with the automation of decision-making processes (Boetto, 2025), the issue of privacy and surveillance (Hodgson et al., 2022) and the promise of saving resources and time spent on routine and repetitive activities (Selwyn et al., 2025). The issue of temporality has become central because the algorithms used to collect and analyse the data gathered within the platforms are predictive, contributing to the logic of anticipation and prediction even in the context of educational and care relationships. Within the society of acceleration (Rosa, 2015), the critical issues raised by the automation of decision-making processes and the risks and opportunities associated with it have prompted us to explore how staff working in socio-educational services perceive and use AI technologies within their working context.

Within this broader context, the present article draws on the wider TEACH-AI project (Transformative Educational Approaches for Civic and Human-centred AI) conducted by the CREDDI research group at eCampus University (Adamoli et al., 2025a, 2026a, 2026b; Rondonotti & Emanuel, 2026), which developed the ARISE-AI framework (Adaptive Responsive Integrated Socio-Educational Artificial Intelligence) and involved over 5,000 Italian teachers and socio-educational professionals. However, the analyses presented here focus specifically on the sub-

sample of support teachers, in order to explore how AI is perceived and used within inclusive educational practices. The project aims to investigate the perception, knowledge and use of generative AI in Italian socio-educational and school services, in line with a growing scientific interest in the relationship between AI and education. To investigate these dimensions, the PAIR-S (Participatory AI for Inclusive Relationships in School) questionnaire was designed (Rondonotti & Emanuel, 2026), based on UNESCO's AI Competency Framework for Teachers (Miao & Cukurova, 2024) and the Guidelines for the Introduction of Artificial Intelligence in Schools developed by the Ministry of Education and Merit (MIM, 2025). Specifically, the questionnaire was developed based on three key theoretical constructs useful for developing the analysis and measuring the impact of AI in educational contexts: "Affordance-in-Practice", which made it possible to investigate the frequency of AI application in the workplace (Costa, 2018); "Capability", referring to skills in the use of AI in both personal and professional experience (Nussbaum, 2011); "Sentiment", which recorded participants' positive or negative emotions towards AI from a socio-cultural perspective (Liu, 2012). In accordance with this theoretical framework, the manuscript explores how a group of Italian support teachers perceive and use AI in their professional practice (Romero-Tena, Martínez-Navarro, & León-Garrido, 2025; Singh & Gupta, 2025).

The three concepts previously introduced are revisited in their original meaning and reinterpreted to address the pedagogical implications of Artificial Intelligence within teaching practice.

2. Theoretical framework

The three concepts previously introduced are revisited in their original meaning and reinterpreted to address the pedagogical implications of Artificial Intelligence within teaching practice.

First, the concept of affordance (Gibson, 1979), referring to the action possibilities offered by an environment or tool, is rearticulated as affordance-in-practice (Costa, 2018). This notion emphasizes that the properties of technology are activated and reinterpreted by users in situated contexts of use, rather than existing as fixed features. Applied to AI in schools, the dimension of affordance-in-practice enables the exploration of whether and how teachers incorporate AI tools into everyday activities-such as lesson planning or preparing instructional materials-highlighting both perceived opportunities and actual practices of use. This perspective underscores the active role of teachers in shaping the action possibilities offered by AI in educational settings, aligning with a logic of feedforward education, which is oriented more toward the future than toward mere feedback on the past (Adams et al., 2009).

Second, investigating capabilities in relation to the connection between teachers and AI entails considering not only competence in using available resources (Sen, 1985) but also the actual possibility of meaningful use within a given sociocultural context (Nussbaum, 2011). This dual focus makes it possible to investigate key dimensions of teaching: distinguishing between access to resources and the ability to benefit from them; grounding analysis in a personalized reading of experience; promoting empowerment and professional autonomy; reflecting on the dialectic between the potential offered by AI and the perception of efficacy and creativity; identifying the coherence between AI use and the socio-educational mission; and capturing the freedoms that AI enhances or inhibits in teaching and educational work. In this sense, capability points to teachers' knowledge, training, and confidence in using AI, that is, the extent to which they can exploit such tools in ways that enrich pedagogy and professional practice, rather than perceiving them as opaque "black boxes" or as sources of external constraint (Anand et al., 2005). This dimension resonates with the need for anticipatory governance in education (Adams et al., 2009): equipping teachers with the technical and critical capacities required to manage digital innovation proactively over time, rather than passively enduring it. Enhancing teachers' capabilities thus allows schools to steer the evolution of AI pedagogically - a form of genuine governance through time (Tulchinsky & Mason, 2023; Walker & Unterhalter, 2007) - instead of merely reacting to technological change.

Finally, the dimension of sentiment concerns the emotional and cultural attitudes with which teachers approach AI. In its original context within opinion analysis, sentiment refers to the positive or negative polarity of expressed evaluations (Liu, 2012). Transposed to education, teachers' sentiment toward AI reflects emotions, concerns, and expectations that can either foster or hinder the adoption of intelligent technologies in schools (Ehlert et al., 2025). The spread of AI systems in educational work generates both enthusiasm for opportunities of support and innovation, and fears of professional deskilling or excessive dependence on automated decision-making (Selwyn, 2019; Pasquale, 2020). Capturing teachers' sentiment - such as levels of optimism, trust, skepticism, or anxiety toward AI - is therefore crucial to understanding the sociocultural and narrative factors that shape practices: positive or negative perceptions of AI tend to influence future educational choices and the modes of technological implementation (Adams et al., 2009).

These three theoretical dimensions provide a multidimensional framework for analyzing how teachers experience the ongoing digital transformation. They connect the micro-level of everyday classroom practices with the macro-level of long-term professional change. In a context of rapid transformation, the ability of the educational system to anticipate and govern the future (feedforward) depends on the opportunities experienced in practice (affordances), the stock of available

professional capacities (capabilities), and the prevailing cultural and emotional orientations (sentiment). Recent studies highlight how AI is reshaping teachers' work, both automating routine tasks and introducing new forms of datafied support for pedagogy (Williamson et al., 2023). The literature on the future of professions points on the one hand to the risk of marginalizing teachers' roles in favor of AI (Susskind & Susskind, 2015), and on the other to the possibility that intelligent technologies may relieve teachers of repetitive burdens, enabling them to focus on high-value human tasks, provided that adoption is oriented toward reinforcing human expertise (Selwyn, 2019; Pasquale, 2020).

In the Italian school system, from early childhood to secondary education, the adoption of these three analytical lenses makes it possible to trace a nuanced profile of how teachers perceive and use AI. By examining actual practices of use (affordance-in-practice), levels of technical and pedagogical preparedness (capability), and the emotional-cultural orientations of the teaching profession (sentiment), the PAIR-S questionnaire addresses both emerging opportunities and challenges, while also identifying the governance conditions required for the effective and sustainable integration of AI into education (Adams *e*t al., 2009; Tulchinsky & Mason, 2023).

3. Material and Methods

3.1 Research context and validated instrument

The TEACH-AI (Transformative Educational Approaches for Civic and Human-Centred AI) project is a research-action programme (Cresswell & Cresswell, 2018) aimed at exploring and supporting the integration of generative artificial intelligence in Italian socio-educational and school contexts (Adamoli et al, 2025a). The project adopted a participatory and dialogical perspective, promoting the co-construction of inclusive AI governance models within educational communities and safeguarding the centrality of the relational dimension in educational work (Stahl et al., 2023; Garkisch & Goldkind, 2025). In this framework, the project also involved the construction and validation of a questionnaire to investigate AI literacy beyond technical competence. The first instrument developed, PAIR (Participatory AI for Inclusive Relationships, Rondonotti & Emanuel, 2026), was designed for socio-educational contexts and showed adequate psychometric robustness. An adapted version for schools, PAIR-S (Adamoli et al., 2026a), was subsequently developed in line with the Guidelines for the Introduction of Artificial Intelligence in Educational Institutions (MIM, Ministerial Decree No. 166 of 09/08/2025), which emphasise the need to tailor AI applications to specific educational targets. PAIR-S consists of 26 questions organised into five sections: socio-demographic and professional information; affordance-in-practice; capability and deprivation;

sentiment toward AI; and basic knowledge of AI. The present analyses rely on the validated factor structure of the instrument, with psychometric indices consistent with those reported in the validation study[1]. In particular, the identification of Deprivation as a distinct factor confirms its conceptual and empirical specificity. Together, Capability and Deprivation allow the instrument to capture dimensions of AI literacy that concern not only knowledge and skills, but also the resources, opportunities, competences, social relations and enabling conditions required to develop and realise valued capabilities (Sen, 1985; Nussbaum, 2011; Anand et al., 2021).

3.2 Procedure and participants

The data was collected using an online questionnaire administered via the QuestionPro platform, during a training course for support teachers in pre-school, primary, and secondary schools (Decree Law No. 71 of May 31, 2024). Participants were informed about the study's purpose, the voluntary nature of participation, and data processing procedures. Informed consent was obtained prior to the survey. No personal or sensitive data were collected, and responses were anonymised and analysed in aggregate, in compliance with international ethical standards

The study sample comprised 1,034 support teachers from across Italy. The socio-demographics characteristics are presented in Table 1.

Table 1: The socio-demographics characteristics (N = 1.034)

Geographical area	42.6% North Italy 13.4% Central Italy 44.1% South Italy and the Islands
Gender	8.4% females 11% males
Age	M = 49 years; SD = 7.19; min = 27, max = 65
Educational qualification	40.4% secondary school diploma 7% bachelor's degree 46.5% master's degree 6.3% specialisation/master/doctorate degree

[1] In the present sample, the psychometric indices were consistent with the validated structure of PAIR-S: KMO = .950; Bartlett's test $p < .001$; five-factor solution explaining 55.3% of the variance; Cronbach's α ranging from .772 to .952 across the main dimensions.

Job role	82.4% non-tenured support teachers 3.8% tenured support teachers 8.9% non-tenured curriculum teachers 4.9% tenured curriculum teachers
Length of service in teaching	M = 8,33 years; SD = 4,63; min = 0, max = 39
Educational level of employment	12.4% pre-schools 44.8% primary schools 25.9% lower secondary school 15.6% upper secondary schools 1.1% vocational education and training or not employed

3.3 Data analysis

Data analyses were conducted using IBM SPSS Statistics 29. Descriptive statistics, including frequencies, means and standard deviations, were used to summarise the main sample characteristics. To explore patterns in attitudes and behaviours toward AI, a K-means cluster analysis was performed (Hartigan & Wong, 1979) on four standardised dimensions: affordance-in-practice, capability, deprivation and sentiment. This procedure identifies groups with similar profiles by minimising within-cluster variance and maximising between-cluster variance. A preliminary hierarchical cluster analysis, based on Ward's method and squared Euclidean distance, was conducted to assess plausible cluster solutions through the agglomeration schedule and dendrogram. Cluster robustness was further examined by repeating the K-means procedure with different random case orderings and checking the stability of the resulting solutions. One-way ANOVAs were then used to compare clusters on both clustering variables and additional measures. Since Levene's test indicated unequal variances ($p < .05$), Welch ANOVAs were conducted (Leys, 2019). Effect sizes were estimated using partial eta squared (ηp^2), and Games-Howell post-hoc tests were applied to identify significant between-cluster differences.

4. Results

4.1 AI use, affordance-in-practice and MIM Guidelines

As mentioned above, the aim of this study is to explore the relationship that support teachers have with AI. The respondents were invited to provide a quantitative assessment of their utilisation of AI in their daily lives (scale from 0-never to 10-always). Participants reported an average of 5.21, with a very high standard deviation (SD = 2.54). These findings indicate that there are discrepancies

in the experiences of the teachers under consideration, suggesting that different modes of interaction and exchange with AI exist.

With regard to affordance-in-practice, as had been anticipated, the questions comprehend references to the MIM's guidelines (2025) in order to understand which aspects of their professional activity already involve the application of AI. Interestingly, some of the highest scores in affordance-in-practice scale correspond to priorities set out in the Ministerial Guidelines on AI in Schools (MIM, 2025), which emphasise personalisation, accessibility, and the creation of inclusive materials. Support teachers primarily employ AI to identify and create interactive teaching tools (M = 3.68), personalise teaching materials (M = 3.40), and translate texts (M = 3.31). The production of original texts (M = 3.21), the creation of presentations and the summarisation of content and documentation are also established practices. On the contrary, more advanced functions such as code creation (M = 1.79), data analysis (M = 2.42) and multimedia production (M = 2.82) are underutilised. The prevailing perspective suggests that AI is predominantly employed for operational support; however, it is evident that there is considerable potential for its advancement towards more innovative and strategic applications.

The integration of AI into professional practice was investigated by posing the question to participants as to whether their organisation had a policy or guidelines for the application (individual or system) of AI. Almost half of the respondents (48.8%) stated that they were unaware of the existence of such guidelines, while only 16.6% reported being aware of internal policies or guidelines. Despite the growing spread of AI, its use still seems to occur mainly in a spontaneous and unregulated manner, without clearly defined institutional frameworks.

During the survey, respondents were asked to indicate the extent to which they currently use AI across different professional domains, as well as how they expect its use to develop in the future. The items in question pertain to a wide range of tasks, including administrative and strategic activities, as well as teaching, staff training, and inclusive practices. The data reveal a clear discrepancy between the current and the expected future use of AI. All the dimensions under investigation demonstrate an anticipated increase, with particular emphasis on support for accessible and inclusive learning (M current = 3.28; M future = 4.44, scale 1-6), a crucial dimension for support teachers. This finding underscores the perceived potential of AI to nurture inclusive and personalised teaching practices, in accordance with contemporary pedagogical recommendations.

4.2 Cluster analysis

A k-means cluster analysis was conducted on the standardized scores[2] of the variables Affordance-in-practice, Capability, Deprivation, and Sentiment (positive and negative) in order to identify distinct participant profiles. The four-cluster solution was retained because preliminary hierarchical analysis suggested it as a plausible partition, and because it provided the most interpretable and stable profile configuration across repeated K-means runs with different random case orderings. The solution that was identified enabled the classification of almost all cases, with only four subjects failing to be allocated to any cluster.

Table 2 presents the final cluster centroids, expressed as mean z-scores, for each variable across the identified clusters.

Table 2: Standardised centroids of the variables used in cluster analysis

Variable	**Cluster 1 (N = 304)**	**Cluster 2 (N = 183)**	**Cluster 3 (N = 212)**	**Cluster 4 (N = 331)**
Affordance-in-practice	0.45	-0.9	0.88	-0.48
Capability	0.57	-0.91	0.96	-0.64
Deprivation	0.59	0.89	-0.71	-0.58
Sentiment positive	0.3	-1.18	1.11	-0.33
Sentiment negative	0.47	0.97	-0.89	-0.39

Note: Values are standardized (z-scores). Positive values indicate above-average levels on the respective variable, while negative values indicate below-average levels.

Figure 1 presents the profile plot of the standardized centroids.

[2] Standardization ensured that all variables contributed equally to the clustering procedure, thereby preventing variables with larger scales from disproportionately influencing cluster formation.

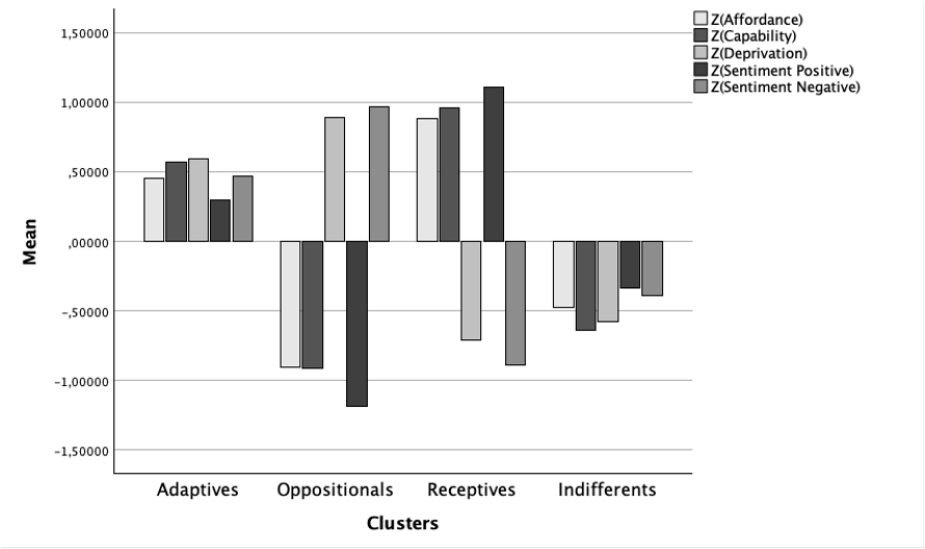


Figure 1: Cluster analysis - profile plot

Cluster 1 is characterised by moderately elevated scores with regard to both affordance-in-practice and capability, as well as deprivation and negative sentiment, accompanied by marginally positive sentiment. The composition of this group is indicative of the experiences of participants who make more comprehensive use of AI, both in terms of opportunities and constraints, and who exhibit ambivalent emotional orientations.

Cluster 2 shows an unfavourable profile, characterised by minimal affordance-in-practice and capability, elevated levels of deprivation and negative sentiment, and a substantial decline in positive sentiment. This cluster is characterised by the presence of participants who face numerous limitations and disengagement related to AI.

Cluster 3 manifests the most positive profile, characterised by high affordance-in-practice, capability and positive sentiment, along with low deprivation and negative sentiment. This group comprises participants who benefit from AI-related resources and advantages and who maintain a positive and proactive orientation.

The results of Cluster 4 indicate a propensity for low scores in relation to all dimensions (affordance-in-practice, capability, deprivation, positive and negative sentiment). This suggests a tendency towards indifference.

4.3 Statistical differences across identified clusters

To examine differences between clusters, a Welch ANOVA[3] and post-hoc comparisons were made using the Games-Howell test, which are robust to unequal variances and unequal group sizes. The results confirmed that all cluster-based differences across the considered dimensions (affordance-in-practice, capability, deprivation, sentiment positive and negative) were statistically significant, with medium-to-large effect sizes (η^2 ranging from .44 to .57[4]).

With respect to the everyday use of AI, cluster membership also had a significant effect (*Welch's F*(3, 511,512) = 129.445, $p < .001$, $\eta^2 = .28$). Post-hoc tests showed that Cluster 3 reported the highest level of use ($M = 6.98$ on a scale of 0-10), followed by the Cluster 1 group ($M = 6.03$). The Cluster 4 group ($M = 4.45$) and the Cluster 2 group ($M = 3.10$) displayed significantly lower averages.

The potential differences between the four clusters were also investigated in relation to questions concerning the MIM AI guidelines, which are included in the affordance-in-practice scale. The results of the Welch ANOVA show statistically significant differences in all areas, as presented in Table 3. The analysis revealed that Cluster 3 exhibited the highest scores, followed by Cluster 1, while Cluster 4 and Cluster 2 showed the lowest scores.

Table 3: Welch's Anova Clusters and MIM priorities

	Cluster 1	*Cluster 2*	*Cluster 3*	*Cluster 4*	*Welch's F*	*Partial eta squared*
Personalisation of teaching material	4.05	2.11	4.62	2.73	Welch's F(3, 515.138) = 185.072, p < .001	.35
Interactive and innovative tools	4.42	2.84	4.92	3.41	Welch's F(3, 513.781) = 169.770, p < .001	.32
Documentation production	3.65	1.85	4.35	2.57	Welch's F(3, 519.281) = 159.771, p < .001	.31
Drafting assessment rubrics	3.03	1.49	3.54	1.9	Welch's F(3, 513.838) = 126.938, p < .001	.27
Organisation educational visits/extracurricular activities	3.13	1.64	3.53	2.08	Welch's F(3, 519.216) = 94.925 p < .001	.21

[3] One-way ANOVA was initially considered. However, Levene's test indicated that the assumption of homogeneity of variances was violated ($p < .05$), suggesting that the standard ANOVA might not be appropriate.

[4] Affordance-in-practice: *Welch's F*(3, 523.037) = 272.183, $p < .001$, $\eta^2 = .44$. Capability: *Welch's F*(3, 510.120) = 443.778, $p < .001$, $\eta^2 = .56$. Deprivation: *Welch's F*(3, 513.689) = 297.874 $p < .001$, $\eta^2 = .46$. Sentiment positive: *Welch's F*(3, 524.212) = 535.601, $p < .001$, $\eta^2 = .57$. Sentiment negative: *Welch's F*(3, 504.930) = 298.308, $p < .001$, $\eta^2 = .44$

Support in tutoring for students	3.77	1.91	4.27	2.4	Welch's F(3, 519.516) = 168.663, p < .001	.32
Support in tutoring among teachers	3.18	1.62	3.65	2.02	Welch's F(3, 514.659) = 118.806, p < .001	.26

5. Discussion

The study, conducted using the PAIR-S questionnaire, provided a detailed picture of Italian support teachers' perceptions and practices regarding the use of AI in education. Cluster analysis offered a critical lens through which to examine how teachers' professionalism is shaped by AI integration, while simultaneously foregrounding implications for training design and the development of targeted competences. Teachers' readiness emerges as a multidimensional construct, articulated across patterns of usage, emotional experience, and the perceived salience of opportunities, a complexity that allows for the identification of distinct interpretative profiles.

The first cluster, defined as *Adaptives*, groups teachers who display medium-high levels of affordance-in-practice and capability, while simultaneously holding ambivalent attitudes in which opportunities and fears coexist in an unresolved tension. Their professional competences with respect to AI appear "situated" in nature: operative and effective within specific contexts, such as the personalisation of teaching materials or the creation of inclusive resources, yet exposed to fragility and discontinuity whenever institutional policies are unclear or absent.

The second cluster, labelled *Oppositionals*, is characterised by low levels of both affordance-in-practice and capability, accompanied by predominantly negative sentiment and a marked perception of professional deprivation. Rather than mere inertia, this limited engagement with AI often reflects a critical stance towards innovations introduced without adequate training provisions or ethical guarantees, a posture that carries its own epistemic legitimacy.

At the opposite end of the spectrum, the *Receptives* of Cluster 3 represent the most proactive profile: high affordance-in-practice, strong capability, favourable sentiment, and low deprivation indices combine to produce teachers who function as genuine innovators, integrating AI into their practice by successfully articulating disciplinary expertise, pedagogical sensitivity, and technological fluency.

Finally, Cluster 4, the *Indifferents*, is distinguished by uniformly low emotional involvement across all dimensions, with agency manifested only in minimal form. For these teachers, AI appears to be largely irrelevant to their professional role: neither a threat nor an opportunity. This attitude may stem from a lack of structured training or from organisational contexts that do not incentivise experimentation.

These four profiles must be read against the backdrop of rapidly evolving Generative AI technologies (Allen & Kendeou, 2023) and in dialogue with the Italian *Guidelines for the Introduction of Artificial Intelligence in Educational Institutions* (MIM, 2025), which set as an explicit objective the provision of continuous and specific training for the effective integration of AI into educational processes. This policy imperative finds direct empirical grounding in the sample's responses: teachers primarily employ AI for foundational tasks — personalising teaching materials, translating texts, generating original content, and summarising documents — while significantly underutilising higher-impact functions such as instructional design support, the monitoring of student learning processes, data analysis, and multimedia production. These more sophisticated affordances are not readily available through mainstream chatbots and require instead the implementation of dedicated AI literacy programmes for both teaching staff and students (Ranieri et al., 2026). Such programmes must pursue a dual objective: the development of technical competences, and the cultivation of pedagogical dispositions that enable an awareness-oriented and critical-thinking-oriented use of AI tools (Miao & Cukurova, 2024; Miao et al., 2024).

Taken together, the four clusters delineate a complex geography marked by divergent attitudes and pluralistic pedagogical visions. A clear fault line separates teachers who perceive AI as a resource for personalising instruction and expanding access to knowledge from those who fear its standardising or bureaucratic dimensions. This fracture maps onto a deepening digital divide, extending the gap between individuals and institutions that possess AI-related skills and resources and those that remain excluded from them (Carter et al., 2020; Luttrell et al., 2025). A hierarchy of applications is also discernible: interactive and personalisation-oriented tools occupy the core of the most competent teachers' experience, while functions related to assessment design, rubric writing, extracurricular organisation, and peer collaboration remain comparatively undervalued. This gradient confirms that AI continues to be conceived primarily as a support for direct instruction rather than as a management or cooperative resource.

Support teachers, by virtue of their professional mission, prove particularly sensitive to AI's inclusive potential: the capacity to modulate content and activities according to individual needs renders technology a significant tool for accessibility (Lamacchia et al., 2025). At the same time, widespread concern persists that algorithmic systems may flatten expressive diversity or erode the relational dimension of educational interaction, a fear that international research identifies as a symptom of the new digital divide, in which technological availability does not automatically guarantee critical or creative engagement with the tool (Kitsara, 2022). From this socio-pedagogical standpoint, the coexistence of different professional cultures within the school is confirmed: Receptive and Adaptive teachers, albeit with different intensity, experiment with AI-based solutions for

educational personalisation and disability support; Oppositional teachers experience innovation as a potential threat to educational autonomy; the Indifferent cluster signals that occasional and unsystematic technology use, in the absence of a shared pedagogical framework, risks producing fragmented interventions with little cumulative impact.

Investment in initial training and continuous professional development remains, therefore, essential for ensuring the informed and ethical deployment of AI tools, alongside risk-aware design of safe and inclusive learning environments (Artyukhov et al., 2024; Moura & Carvalho, 2024; Singh & Gupta, 2025). The absence of shared institutional policies, one of the most critical findings of the present study, exposes professionals to an ethically unsupervised use of AI (Holmes et al., 2022). The development of participatory governance frameworks, actively involving special education teachers, school psychologists, and administrators, could support an integration of AI aligned with the principles of Universal Design for Learning, fostering educational processes that are more equitable, flexible, and genuinely responsive to student diversity.

6. Conclusions

Cross-referencing these interpretations reveals a broader trend that warrants further analysis and investigation: AI is welcomed as a potential amplifier of individual capabilities and an enabler of opportunities, but its legitimacy depends on preserving expressive richness, privacy and the quality of relationships. Positive sentiment stems from the expectation that technology will free up time and resources and make knowledge and services more accessible; negative sentiment stems from the fear that these benefits will be accompanied by a standardisation of forms of expression and an impoverishment of interpersonal experience (Al-Zahrani, 2024). The intertwining of the concepts of capability and sentiment, although analysed in their specificity, reveals that the acceptance of AI depends not only on what it does, but also on how it does it and how it is perceived in the cultural fabric. From this perspective, the pedagogical challenge, starting from the school dimension that emerges from support teachers, appears to be the design and use of AI systems that are not only performative, but that concretely expand the range of choices and are consistent with the emotional aspirations of teachers and educational communities, according to a logic of widespread rights and social justice (Buccella, 2023).

This challenge necessitates the development of a governance model by the education system that can equip teachers with the technical and critical skills required to proactively manage digital innovation. As also indicated in the Ministerial Guidelines, this would enable schools to pedagogically guide the

evolution of AI, exercising a genuine form of governance over time, rather than simply reacting to external innovation trends.

Although this study provides relevant insights, some limitations should be acknowledged. Cluster analysis is exploratory rather than confirmatory and depends on variable selection and the chosen number of clusters (Ketchen & Shook, 1996). Moreover, the theoretical interpretation of clusters involves a degree of researcher subjectivity (Van Mechelen et al., 2023); therefore, the results should be considered as an exploratory tool to be strengthened through theoretical triangulation, independent validation, or complementary methods. Although the sample is large and national, it includes only support teachers, whose professional role has specific features, thus limiting the generalisability of the findings to the broader teaching population. In addition, data are self-reported and may therefore be affected by social desirability bias or discrepancies between declared and actual practices. However, within the broader TEACH-AI project, further analyses have involved other professional groups, including teachers and socio-educational professionals (Adamoli et al., 2026b). The present article deliberately focuses on support teachers, allowing a more specific interpretation of their professional condition in relation to AI affordances, capabilities, deprivation, and sentiment.

Future research should complement survey data with qualitative methods, such as interviews, focus groups, and observations, in order to better capture the narrative and cultural dimensions of AI use. Further studies could examine whether the profiles identified here are influenced by the high proportion of non-tenured teachers in the sample, as well as by socio-demographic and professional variables such as age, geographical area, and length of service. Finally, cross-national research would allow comparison between the Italian context and other educational systems, clarifying how school policies and cultures mediate the adoption of AI.

Author contributions

All co-authors contributed to the design and implementation of the research. This contribution represents the result of a collaborative effort by the authors. With regard to the writing of the manuscript, individual contributions may be attributed as follows: Matteo Adamoli authored §1, §2, Federica Emanuel §3, Marco Rondonotti §4, Michele Marangi §5 and Paolo Raviolo §6.

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