

Rethinking Artificial Intelligence for inclusion and disability support. Trajectories and trends of italian pedagogical research

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Abstract: The paper explores Italian pedagogical scientific literature to examine the relationship between artificial intelligence (AI), disability, and inclusion. Through a scoping review, emerging themes in the academic debate are identified, highlighting both progress and critical issues. The research focuses on articles published between 2014 and 2024 in Italian Class A journals (ANVUR, sector 11/D), selecting only open-access publications to ensure maximum accessibility. Following the Arksey and O'Malley (2005) framework, thematic and methodological trends were analyzed to answer three key questions: 1) the growth of studies on AI applied to inclusion, 2) the predominant research methods, and 3) the main areas of investigation. The analysis reveals a progressive increase in publications up to 2024 and a more mature critical debate. The findings indicate a predominance of theoretical-epistemological approaches, with limited empirical studies. Results suggest a growing openness to intelligent digital ecosystems for personalized education, with increasing attention to ethical implications but a less developed focus on disability.

Keywords: Artificial intelligence; Inclusive Education; Scoping Review; Educational Context; Trends in Pedagogical Research.



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1. Artificial Intelligence as a Beacon of Inclusion

Artificial Intelligence (AI) represents a field of great interest for pedagogy and educational technologies. According to international regulations, AI is defined as a computational system designed to simulate human capabilities such as learning, reasoning, and adaptation (ISO/IEC 22989:2022; UNESCO, 2021). Through advanced techniques, it can generate predictions, decisions, and recommendations, influencing both physical and virtual environments (EU AI Act, 2021; OECD, 2024).

The OECD document (2024) highlights its transformative role, recognizing both its benefits, such as improved decision-making processes, and its ethical and social risks. A human-centered approach and AI reliability are therefore crucial aspects. The IEEE 7010 framework expands this perspective, describing AI as the ability of

¹For a more precise attribution of the parts, the paragraphs 1, 4, 5 can be assigned to Andrea Fiorucci and the paragraphs to Alessia Bevilacqua 2, 3, 6.

computational systems to operate autonomously and integrate perception, reasoning, and action. The IEEE 7010-2020 standard provides guidelines for assessing the ethical and social impact of AI technologies on human well-being throughout their lifecycle.

National and international strategies, such as the Italian Strategy for Artificial Intelligence 2024-2026 (AGID, 2024) and the UNESCO Recommendation (2021), converge on the need to design ethical, secure, and sustainable AI systems. In the educational field, Artificial Intelligence in Education (AIed) refers to the application of AI to support learning and teaching through tools such as intelligent tutors, chatbots, educational robots, and automated assessment systems. These tools facilitate personalized learning paths, improve accessibility, and automate administrative tasks, freeing resources for human interaction.

AI is not just a tool but redefines educational paradigms, while requiring a critical and conscious approach. Its rapid diffusion raises fundamental questions for education and schools. Without adequate AI literacy, which includes technical skills and critical reflection (Agrusti, 2023; Ranieri, Cuomo & Biagini, 2022; Panciroli & Rivoltella, 2022), there is a risk of losing the added value of human intelligence (Pinnelli, 2024). Educating in critical thinking means recognizing reliable information, formulating relevant questions, and consciously leveraging AI resources.

However, critical issues also arise: dependence on AI systems, privacy risks, excessive simplification of content, reproduction of unverified sources, and dominance of certain cultures. In recent years, studies on AIed have highlighted the role of adaptive and inclusive learning environments (Nirchi, 2021; Allodola, 2024), responding to the challenges posed by the rapid spread of AI in education.

Systematic reviews provide an overview of the state of research: some analyze AI technologies in education (Xia et al., 2023; Zawacki-Richter et al., 2019; Castillo-Martínez et al., 2024; Chen et al., 2020), while others focus on specific domains such as mathematics, languages, or medicine (Karaca et al., 2021), educational assessment (González-Calatayud et al., 2021), or adaptive learning (Nigam et al., 2021; Papadopoulos et al., 2020). Bozkurt et al. (2021) explored trends and geographical distribution of AIed publications.

An emerging field concerns the role of AI in special and inclusive education. The literature highlights its revolutionary potential in supporting learning and inclusion of students with disabilities or special educational needs (Zdravkova, 2022; Garg & Sharma, 2020; Kohli et al., 2021; Roy & Swargiary, 2024). AI, through personalized and adaptive systems, can reduce barriers and enhance learning, contributing to the creation of more accessible and inclusive educational environments.

Artificial intelligence holds extraordinary potential to break down the barriers that limit the autonomy of people with disabilities (Collins et al., 2022; Dixon et al., 2022; Slee & Tait, 2022). Its application in this field marks a paradigm shift in how society perceives and implements accessibility. While traditional approaches primarily focus on retrofitting physical spaces or offering standardized solutions, AI paves the way for highly personalized support, extending beyond the physical realm. Through these technologies, individuals with disabilities can navigate and interact with their surroundings more independently, overcoming obstacles that have historically hindered their full participation (Morris, 2020; Bricout et al., 2021).

The intersection of AI and disability inclusion unfolds through multiple pathways of research and innovation. From advanced assistive technologies that enhance independence and quality of life to groundbreaking advancements in healthcare, including tools for early diagnosis and personalized treatment, the potential of this technological revolution is vast. However, the focus is not solely on developing new solutions—ethical debates, real-world case studies, and emerging challenges play a crucial role in shaping the true impact of this transformation.

This article delves into the Italian educational scientific literature, unraveling the intricate connections between AI, disability, and inclusion. Our objective is clear: to harness the power of artificial intelligence to make accessibility a tangible reality, foster a more inclusive society, and unlock new opportunities for individuals with disabilities. In the following sections, we will explore the key areas where AI is driving meaningful change, highlighting both the progress achieved and the challenges that remain. Through this analysis, we aim to contribute to the vision of a world where barriers dissolve, and possibilities multiply.

2. Research objectives

On the basis of the scientific interest inherent to IAed, through the methodology of the scoping review, it was decided to explore research topics and trends, of a theoretical-argumentative and empirical nature, attributable exclusively to the Italian pedagogical literature, using specific criteria for the selection of sources and for the analysis of emerging trends. The aim is to provide a picture of the main national research topics, often underrepresented in international mappings that privilege works indexed in global repositories (such as ERIC, Scopus and Web of Science), neglecting the expressive diversity of local research.

The research focuses on articles published between 2014 and 2024 in Italian journals of Class A, classified by ANVUR for the macro sector 11/D (Pedagogy, History of Pedagogy, Didactics, Special Pedagogy and Re-educational research).

No qualitative assessment of the articles will be carried out, as quality is already guaranteed by placement in accredited scientific journals. Contents will not be discussed in detail, but mapped by macro-areas through thematic analysis. The methodology follows the framework of Arksey and O'Malley (2005) and Levac, Colquhoun and O'Brien (2010), aimed at identifying key concepts and gaps in the literature to guide future research. The scoping review developed in five stages: definition of questions, identification and selection of relevant studies, synthesis of results and formulation of conclusions.

3. Research objectives

3.1 Research questions

The research questions (RQ) that guided the study are:

RQ1: In recent years, has Italian pedagogical research shown an increase in studies on AI specifically related to inclusive education?

RQ2: Which methodological approaches and research methods are predominant?

RQ3: What are the main trends and thematic areas explored?

3.2 Inclusion/exclusion criteria

In the process of selecting relevant studies, specific inclusion and exclusion criteria were applied (Figure 1). In this paper scientific articles published in the last ten years (2014–2024) in Italian journals listed in the ANVUR Class A scientific journal list (updated as of December 31, 2024) for the Macro-Sector 11/D were included.

As a result of this initial selection, all journals that do not follow an open access policy were excluded. The decision to include only Italian open-access journals in the scoping review was driven by the need to ensure accessibility and relevance of the results for a broad and diverse audience, including not only researchers but also educators and policymakers. This choice aligns with the principles of open science.

Figure 1. Inclusion and Exclusion Criteria in the Scoping Review

Criteria	Inclusion	Exclusion
Publication Year	Studies published between January 2014 and December 2024 in Italian A-rank journals	Studies published before January 2014 or after December 2024
Type of Studies	Scientific articles published in Italian A-rank journals and following open-access policies	Editorials, monographs, indexes, e-books, periodicals, posters, book chapters, reviews, scientific articles in non-A-rank or foreign journals, or scientific articles not available in open access
Authors	Studies published exclusively by Italian authors or by Italian authors in collaboration with foreign authors	Studies published exclusively by foreign authors
Language	Studies published in Italian or other languages	N/A
Topic	Studies investigating intelligent digital systems in relation to special education	Studies investigating AI from a perspective other than special education
Research Approaches	Studies conducted using different research designs: theoretical-argumentative, qualitative, quantitative, literature reviews, systematic reviews, meta-analyses, action research interventions, experimental designs, etc.	N/A

The scoping review has the main objective of outlining an overall picture of the Italian pedagogical debate concerning IAed in Inclusive Education.

The intention is to bring out the key themes and main research trends, both theoretical and empirical, that characterise this debate, offering a useful mapping to understand the current state of studies and identify future perspectives.

This approach not only highlights the academic debate, but also provides a useful tool for practitioners and policy makers to orient themselves in a landscape of studies that, even if they are different from each other, presents significant lines of convergence.

In this way, the scoping review is not limited to a simple reconnaissance, but is intended as a critical and strategic contribution to foster a collective reflection on the responsible and innovative use of AI in inclusive education.

3.3 Source selection

The scoping review started with the analysis of the ANVUR Class A scientific journal list, which included 2.270 records.

From here, it focused on Area 11/D (522 records), eliminating duplicates (368) and limiting itself to Italian journals, bringing the list down to 57 titles. After further analysis of the publishing purposes, 42 open access journals were selected with a specific focus on educational research (Figure 2).

Figure 2. List of selected journals in open access

1. ANNALI DI STORIA DELLE UNIVERSITÀ ITALIANE	22. L'INTEGRAZIONE SCOLASTICA E SOCIALE
2. ANNALI ONLINE DELLA DIDATTICA E DELLA FORMAZIONE DOCENTE	23. LIFELONG LIFEWIDE LEARNING (LLL)
3. CIVITAS EDUCATIONIS	24. MEDIA EDUCATION
4. CQIA RIVISTA	25. METIS
5. DIRIGENTI SCUOLA	26. ORIENTAMENTI PEDAGOGICI
6. EDUCATION SCIENCES & SOCIETY	27. PEDAGOGIA E VITA
7. EDUCATIONAL REFLECTIVE PRACTICES	28. PEDAGOGIA OGGI
8. EDUCAZIONE APERTA	29. PEDAGOGIA PIÙ DIDATTICA
9. EDUCAZIONE LINGUISTICA LANGUAGE EDUCATION	30. Q-TIMES WEBMAGAZINE
10. EDUCRAZIA	31. QWERTY
11. ENCYCLOPAIDEIA	32. REM
12. FORM@RE	33. RESEARCH TRENDS IN HUMANITIES EDUCATION & PHILOSOPHY
13. FORMAZIONE & INSEGNAMENTO	34. RICERCAZIONE
14. GIORNALE ITALIANO DELLA RICERCA EDUCATIVA	35. RICERCHE DI PEDAGOGIA E DIDATTICA
15. GIORNALE ITALIANO DI EDUCAZIONE ALLA SALUTE, SPORT E DIDATTICA INCLUSIVA	36. RICERCHE PEDAGOGICHE
16. I PROBLEMI DELLA PEDAGOGIA	37. RIVISTA DI STORIA DELL'UNIVERSITÀ DI TORINO
17. ITALIAN JOURNAL OF EDUCATIONAL TECHNOLOGY	38. RIVISTA ITALIANA DI EDUCAZIONE FAMILIARE
18. ITALIAN JOURNAL OF SPECIAL EDUCATION FOR INCLUSION	39. SCHOLÉ
19. JE-LKS. JOURNAL OF E-LEARNING AND KNOWLEDGE SOCIETY	40. SCUOLA DEMOCRATICA
20. JOURNAL OF EDUCATIONAL, CULTURAL AND PSYCHOLOGICAL STUDIES	41. STUDI SULLA FORMAZIONE
21. JOURNAL OF INCLUSIVE METHODOLOGY AND TECHNOLOGY IN LEARNING AND TEACHING	42. STUDIUM EDUCATIONIS

For the scoping review, all issues published by the selected journals from 2014 to 2024 were analysed, with the exception of a few journals that did not have the full number of issues during this period (Figure 3).

Figure 3. List of journals with partial access

Journals	Notes
<i>Dirigenti Scuola</i>	It did not publish any scientific articles in 2016.
<i>Educational Reflective Practices</i>	Articles only available from 2021 to 2024.
<i>Educazione Aperta</i>	Articles available from 2017.
<i>Educrazia</i>	Articles available from 2020 to 2024.
<i>Giornale Italiano di Educazione alla Salute, Sport e Didattica Inclusiva</i>	Articles available from 2017.
<i>Journal of Inclusive Methodology and Technology in Learning and Teaching</i>	Articles available from 2021.
<i>Pedagogia Oggi</i>	Available online since 2017.
<i>Pedagogia più Didattica</i>	Available online since 2015.
<i>REM</i>	Articles available from 2015 to 2024.
<i>Ricerche pedagogiche</i>	Available online since 2018.
<i>Scholé</i>	Available from 2018 to 2024.

The selection methodology for the scoping review analysed scientific articles published between 1st January 2014 and 31th December 2024.

To delimit the selection of studies, a number of keywords, relating to the main theme and setting (Figure 4), were identified analyzing every journal index of the 42 scientific journals selected (n. 14.371).

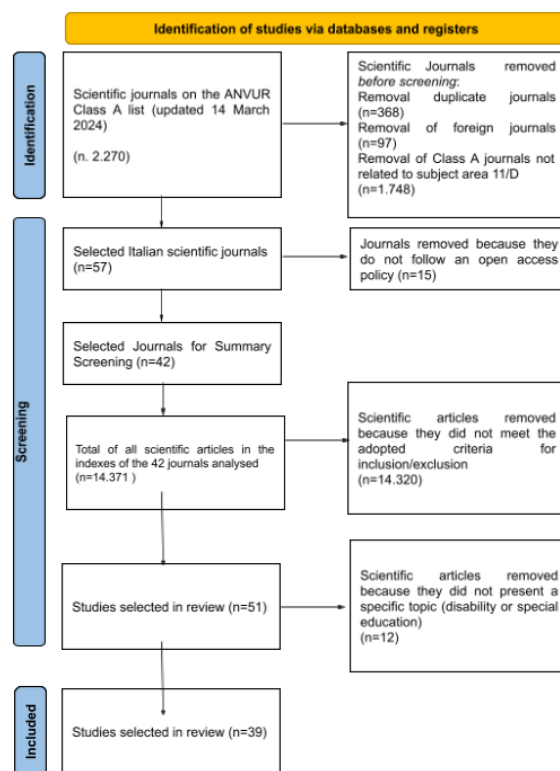
Keywords included their synonyms and acronyms (AI, AGI, IA, etc.) in order to maximise the search for studies.

Figure 4. Search string

Main theme	Setting
Artificial Intelligence, AI, IA, General Artificial Intelligence, AGI, Artificial Intelligence in Education, AIED, educational data mining, Chat GPT, Copilot, AI Literacy, BERT, Artificial Intelligent Systems	Special Education, Inclusion, Inclusive Education, DSA, BES, Special Educational Needs, Specific Learning Disorders, Autism, Giftedness, ADHD, Attention Deficit Hyperactivity Disorder, Sensory Disabilities (visual and/or auditory), Intellectual Disabilities, Motor Disabilities, Speech Disorders, etc.

The selection process (Figure 5) identified 39 scientific articles, mainly produced by groups of Italian authors, with rare international collaborations.

Figure 5. The selection process of research articles, PRISMA model



The table below lists all eligible articles, selected according to the inclusion criteria. It should also be noted that, in 31 of the 42 journals analysed, there are no contributions on the subject under study.

Figure 6. Studies included in the scoping review

Nome della rivista	Contributi	Asse EPISTEMOLOGICO (Teorico e/o storico)	Asse PRASSEOLOGICO (Sperimentale e/o empirico)
Education Sciences & Society (n.3)	Cesaroni, 2024	X	
	Lo Piccolo & Pasqualetto, 2024	X	
	Caffaratti & Monchietto, 2024	X	
Educrazia (n.9)	Mulè, 2024	X	
	Muscarà, 2024	X	
	Perciavalle, 2024		X
	Tigani & Coletta, 2024	X	
	Spadafora, 2024	X	
	Leva, 2024	X	
	Costantino, 2024	X	
	Calenda, 2024	X	
	Monaco & Muscarà, 2024	X	
Formazione & Insegnamento (n.2)	Caligiuri, 2018	X	
	Fabiano, 2022	X	
Giornale Italiano di Educazione alla Salute, Sport e Didattica Inclusiva (n.12)	Campitiello, Arduini & Di Tore, 2022		X
	Fabiano, 2022	X	
	Salis & Punzo, 2023		X
	Peconio, Ciletti, Rossi & Toto, 2024		X
	Marzullo, 2024		X
	Minino, 2024	X	
	Lecce, Sozio & Di Tore, 2024		X
	Amadoro & Di Gennaro, 2024	X	
	Sgambelhuri, Lo Iacono & De Domenico, 2024	X	
	Di Domenico, Mangione & Bruni, 2024	X	
Italian Journal of Special Education for Inclusion (n.3)	Montanari & Sibi, 2024		X
	Campitiello, Schiavo & Di Tore, 2024		X
	Zanon, Pascoletti & Di Barbora, 2024		X
	Fiorucci & Bevilacqua, 2024		X

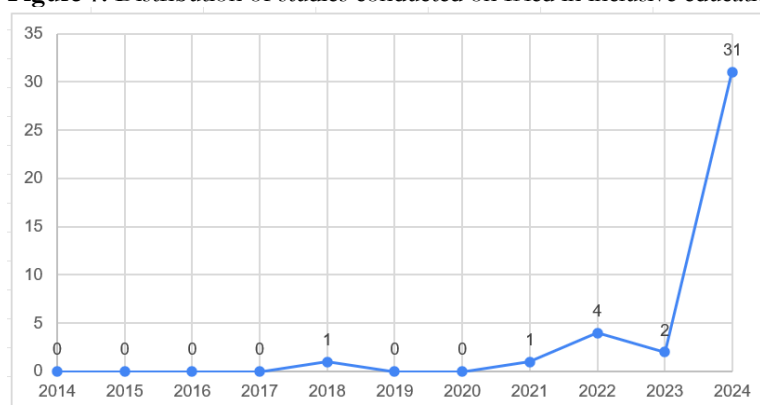
Nome della rivista	Contributi	Asse EPISTEMOLOGICO (Teorico e/o storico)	Asse PRASSEOLOGICO (Sperimentale e/o empirico)
	Pellegrini & Sebastiani, 2024		X
Journal of Inclusive Methodology and Technology in Learning and Teaching (n.5)	Zappalà, 2021		X
	De Giuseppe, 2024	X	
	Fabiano & Cirolia, 2024		X
	Pagliara, Bonavolontà & Mura, 2024	X	
	Zappalà, Viola & Galdieri, 2024		X
Orientamenti Pedagogici (n.1)	Cascino, 2024	X	
Q-Times Webmagazine (n.1)	Natali, 2023		X
Research Trends in Humanities Education & Philosophy (n.1)	Di Tore, Di Tore, Axelsson, 2022		X
Scholè (n.1)	Lembo, Tombolini, Battaglia & Peluso Cassese, 2024	X	
Stadium Educationis (n.1)	Ferro Allodola, 2024	X	

4. Summary of results

4.1 Diffusion and time distribution of studies

In answer to the first research question (RQ1: In recent years, has Italian pedagogical research shown an increase in studies on AI specifically related to inclusive education?), the results of the survey show that the number of publications has progressively increased in recent years, until a real deflation in 2024 (no. 31) (Figure 7).

Figure 7. Distribution of studies conducted on IAed in inclusive education (2014 to 2024)



The pedagogical community has gradually adopted a more critical and balanced approach to the use of AI in educational contexts, overcoming the initial apocalyptic views that tended to demonise its use. According to Selwyn (2019), this transition reflects a cultural adaptation to the challenges posed by emerging technologies, highlighting a growing awareness of the benefits and risks associated with AI.

The evolution of the debate underlines the shift from a reductionist perspective to a more nuanced understanding, which considers AI not only as a threat, but as an integrated and transformative tool (Cukurova, Luckin & Kent, 2020). This cultural shift is part of a broader framework of social and institutional maturation, in which technological innovations are analysed constructively and critically.

The Italian pedagogical community, through the research contributions presented, shows a growing openness towards intelligent digital ecosystems, such as adaptive systems and tools supporting educational customisation. All nevertheless, this evolution is accompanied by critical attention to ethical implications and rigorous supervision, which are necessary to ensure that AI truly contributes to the improvement of education, while avoiding replicating the biases and fragilities intrinsic to the fallible systems from which it originates.

4.2 Investigation approaches and methods

In response to the second research question (RQ2: Which methodological approaches and research methods are predominant?), the 39 scientific articles analysed contribute to the debate on AI in inclusive education through interdisciplinary reflections, both theoretical and empirical, applied to different educational contexts, with a particular focus on didactic aspects.

Adopting the metaphor of the two convoys for pedagogical research proposed by Frabboni (2009), the analysis explored both the epistemological convoy, which moves along the theoretical and historical tracks with a predominantly qualitative approach, and the praxeological convoy, which moves along the experimental and empirical tracks, characterised by quantitative procedures.

However, precisely assigning a methodological approach to the works examined proved complex, due to the lack of explicitness or clarity in the research designs. To address this difficulty, a recursive methodology based on repeated triangulations was adopted, which made it possible to broaden and reorganise the categories and inclusion criteria.

These have been brought back to two main axes: the epistemological axis, which includes theoretical and historical approaches, and the praxeological axis, which includes experimental and empirical ones (Figure 8). This process made it possible to systematise and enrich the analysis of the scientific contributions examined.

Figure 8. Research trends

	Epistemological axis (Theoretical and/or historical)	Praxeological axis (Experimental and/or empirical)
n. scientific articles	23	16
percentage	58,97%	41,02%

With reference to the first axis, 31 articles were found. These are inquisitive approaches that, despite the variety of their paradigms (axiological-metatheoretical, philosophical-epistemological, etc.), share the practice of a critical and problematising method for reflecting on the challenges, in terms of risks and opportunities, presented

by AId in Inclusive Education. Within this group, there are no contributions of a comparative-historical nature.

Along the praxeological axis, there are some research syntheses presenting literature reviews or critical reviews, but not systematic reviews or meta-analyses.

To a greater extent, the articles present descriptive-qualitative or quantitative non-sampling studies (case study, narrative, content analysis, phenomenological or ethnomethodological analysis) and descriptive-quantitative studies without an experimental design in which a data collection conducted with a questionnaire or observation form is noted.

On the other hand, research with randomised or quasi-randomised experimental research designs is in short supply.

4.3 Thematic analysis of key research trends in Italian pedagogy on AI for inclusive education

The thematic analysis aims to interpret and organize textual content by identifying meaningful themes and clusters. The primary goal is to highlight common meanings and differences within a textual corpus. This analysis was conducted following the methodological framework proposed by Braun and Clarke (2006), structured into clearly defined phases. Initially, a careful reading of each text was performed to become familiar with the content and to establish initial descriptive codes related to key topics (e.g., artificial intelligence, inclusion, disability, teacher education, emotions, personalized learning). Subsequently, these initial codes facilitated the progressive grouping of texts into broader thematic categories. At this stage, some titles were re-assigned across categories to enhance internal coherence and consistency. Finally, each identified thematic cluster was labeled with a concise but representative label encapsulating the overarching meaning emerging from the grouped texts.

The clusters presented below represent macro-areas outlining the primary research themes on artificial intelligence applied to inclusive education within the Italian pedagogical literature.

Figure 9. IAed in Inclusive Education topic clusters

Cluster	Main Focus Areas	Key Concepts
Cluster 1	Theoretical foundations and critical perspectives on ai in special education	Ethical implications, Theoretical frameworks, Critical assessments
Cluster 2	AI responding to special educational needs and functional modalities	Autism, ADHD, Learning disabilities, Visual impairments, Personalized technologies, Adaptive environments, Practical effectiveness
Cluster 3	AI in inclusive teacher training	Professional development strategies, Training frameworks, Required competencies
Cluster 4	Integration of AI, embodiment, and immersive technologies for inclusion	Digital inclusive didactics, Physical and virtual embodiment, Virtual reality (VR), Augmented reality (AR), Educational robotics, Experiential learning environments

Cluster 1: Theoretical Foundations and Critical Perspectives of AI in Special Education

This cluster critically addresses the theoretical foundations, critical perspectives, and practical implications of AI in special education, emphasizing the necessity of a reflective, democratic, and ethical pedagogical approach. Historical and theoretical analyses highlight the dangers of oversimplifying educational inclusion through a

purely technocratic approach, advocating instead for conscious and democratic pedagogical frameworks (Spadafora, 2024; De Giuseppe, 2024). The socio-political dimension enriches this analysis by addressing risks inherent in the confusion between inclusion and technological advancement, stressing the urgency to avoid techno-centric simplifications and underscoring the need for educational systems that are both inclusive and socially equitable (Caligiuri, 2022; Di Domenico, Mangione & Bruni, 2024). Adaptive learning technologies supported by AI emerge as effective tools for personalized education, particularly beneficial for students with disabilities or from disadvantaged backgrounds, providing opportunities for targeted and individualized learning experiences (Lo Piccolo & Pasqualetto, 2024). Additionally, an authentically inclusive education must emphasize relational and bodily dimensions, thus enhancing humanistic experiences beyond virtual boundaries (Sgambelluri, Lo Iacono & De Domenico, 2024).

Cluster 2: AI in Response to Special Educational Needs and Functional Modalities

This cluster critically explores the conscious application of AI in educational settings tailored for students with special educational needs, including autism, specific learning disorders (SLD), ADHD, and visual impairments. For autistic students, innovative pedagogical strategies are developed using advanced technologies such as educator avatars, which facilitate emotional and social co-regulation through visuo-auditory neurosensory stimulation (Monaco & Muscarà, 2024). Additionally, educational robots equipped with AI significantly support socio-emotional skill development through advanced emotional recognition and interaction technologies (Campitiello, Schiavo & Di Tore, 2024). The ecological model for designing inclusive hybrid environments is further introduced as an effective educational framework tailored for students with ASD (Zappalà, 2021; Perciavalle, 2024; Leva, 2024).

For students with specific learning disabilities (SLD), AI emerges as a powerful tool for enhancing metacognition and promoting study autonomy through personalized learning pathways, effectively boosting self-esteem and academic performance, especially for students with dysgraphia (Lembo et al., 2024; Tigani & Coletta, 2024).

In addressing ADHD, the cluster emphasizes emotional management through the combined use of virtual reality and AI, enabling personalized educational experiences that significantly enhance emotional regulation and active participation (Minino, 2024).

Regarding visual disabilities, the cluster emphasizes the critical need to remove digital barriers and fully exploit virtual learning environments' potential, ensuring universal accessibility and preventing algorithmic discrimination (Amadoro & Di Gennaro, 2024).

Cluster 3: AI in Inclusive Teacher Training

This cluster critically examines the application of AI in teacher training, exploring personal epistemologies, perceptions, and attitudes towards inclusive technologies. Text analysis and semantic indexing are highlighted as effective tools for uncovering implicit assumptions and themes influencing educators' conceptualization of inclusion (Campitiello, Arduini & Di Tore, 2022; Di Tore, Di Tore, Axelsson, 2022).

The emotional dimension gains particular relevance in training, recognizing both the enriching potential and practical complexities of integrating emotional awareness with AI technologies (Montanari & Sibi, 2024; Peconio et al., 2024). Empirical studies on future teachers' attitudes towards AI-based educational technologies demonstrate the importance of technological awareness and personal satisfaction for effective adoption, especially in teaching students with autism spectrum disorders (Zappalà, Viola & Galdieri, 2024). Video-analysis enhanced by AI provides immediate, personalized formative feedback, emphasizing the central role of teachers and promoting continuous and synchronous professional development (Natali, 2023; Caffaratti & Monchietto, 2024; Lecce, Sozio & Di Tore, 2024).

Furthermore, generative AI tools such as chatbots are highlighted for optimizing instructional design, significantly enhancing personalization and adaptability in inclusive educational practices (Zanon, Pascoletti & Di Barbora, 2024). Additionally, the cluster addresses the challenges and opportunities in integrating assistive technologies and AI in special education, highlighting practical training needs and infrastructure availability in Italy (Pellegrini & Sebastiani, 2024). AI-driven educational inclusion is examined from a universal personalization perspective, advocating for methodologies that extend beyond special education to significantly enrich general educational experiences without compromising the essential human interactions at their core (Pagliara, Bonavolontà & Mura, 2024).

Cluster 4: Integration of AI, Embodiment, and Immersive Technologies for Inclusion

This cluster addresses the integration of AI, embodiment, and advanced digital technologies in inclusive education, highlighting the importance of moving beyond mere digital replication to embrace the complexity of physical and virtual embodiment. Inclusive digital pedagogy must fully recognize the bodily complexities of individuals with disabilities, fostering meaningful educational experiences through innovative teaching approaches (Spadafora & Fabiano, 2022). Such perspectives advocate transcending purely digital limitations by proposing educational models that harmoniously blend bodily, emotional, and cognitive dimensions in AI-assisted learning environments (Marzullo, 2024). Empirical studies support these models through innovative narrative approaches demonstrating immersive technologies' effectiveness, such as virtual reality and augmented reality, alongside educational robotics (Salis & Punzo, 2023). These immersive technologies foster highly engaging and tailored educational experiences, effectively responding to the diverse needs of students with disabilities and enhancing overall educational effectiveness and inclusivity.

5. Conclusions

The cluster analysis, derived from an in-depth examination of the selected contributions based on the study's keywords, reveals how AI is progressively emerging—now with fewer prejudices—as a powerful tool for redefining accessibility and support for people with disabilities. This is not merely a technological advancement but a true transformative force capable of expanding opportunities, fostering inclusion, and reshaping traditionally imposed limitations. This path of innovation outlines

a landscape rich in possibilities and challenges, where AI does not merely compensate for difficulties but actively enhances individual abilities.

The findings of this study provide a comprehensive overview of the relationship between AI and inclusive education within Italian pedagogical research. The scoping review highlights the evolution of the academic debate, revealing both its transformative potential and the methodological and practical challenges it entails.

Regarding RQ1, the analysis confirms a steady increase in studies on AI and inclusive education over the past decade, with a peak in recent years followed by a slight decline. This trend suggests that, while AI remains a topic of great interest, the research community is transitioning from an initial phase of enthusiasm to a more critical and structured approach to its application. The debate has shifted from a technocentric perspective - initially focused on AI's disruptive potential - to a more contextualized understanding, where AI is seen as a tool integrated within broader educational frameworks rather than an autonomous transformative force.

Regarding RQ2, the review shows that qualitative and theoretical approaches dominate the field, with a strong presence of epistemological and critical studies. Empirical and experimental research, however, remains relatively scarce, with few studies adopting systematic methodologies such as randomized controlled trials or longitudinal investigations. The predominance of qualitative-descriptive methods (case studies, content analysis, narrative approaches) underscores the need for a more solid empirical foundation to validate the real impact of AI in inclusive education. This highlights two key priorities: strengthening theoretical debates while simultaneously fostering evidence-based research to provide concrete data on AI's added value in educational contexts.

or RQ3, thematic analysis identified four main research strands.

1. *Theoretical and critical perspectives on AI in education*, focusing on epistemological and socio-political implications.
2. *AI applications for special educational needs*, particularly concerning autism, ADHD, learning disabilities, and visual impairments.
3. *AI in teacher training*, examining how AI can support rather than replace educators.
4. *Integration of AI with immersive technologies*, emphasizing the role of virtual reality, augmented reality and educational robotics in enhancing inclusive learning experiences.

The thematic analysis reveals a broader focus on inclusion rather than a specific emphasis on AI-driven strategies tailored to special educational needs. This contrasts with international literature, which is more inclined toward identifying and experimenting with solutions that directly address disabilities, aiming at skill enhancement, adaptation, and autonomy. In contrast, Italian research adopts a more extensive socio-educational perspective, leaving room for further exploration into AI's role in special education pedagogy and the direct application of AI-based tools to the specific needs of students with disabilities.

This scoping review not only provides an updated mapping of the Italian academic debate on AI and inclusion but also encourages a broader reflection on future research directions. Strengthening the connection between theory and practice,

promoting more rigorous experimental studies, and developing AI models specifically tailored to the needs of students with disabilities represent the next challenges to ensure the effective and responsible use of artificial intelligence in inclusive education.

6. Limitations

Three limitations need to be considered: 1) the search strings may not be exhaustive, excluding some articles; 2) some publications in grey literature or non-Band A journals, which would have offered complementary perspectives, were not complementary perspectives were not considered; 3) some of the reviewed studies deal with AI in general without specifying particular technologies, limiting the depth and focus of the results.

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