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A Systematic Literature Review of Models, Technologies, and Global Impacts in Inclusive Education in the Digital Age

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Abstract: Inclusive education faces persistent challenges related to resource gaps and social isolation. The post-pandemic convergence with digital technologies and the need for novel collaborative models present a transformative opportunity, yet no systematic review has holistically integrated these three core elements. This Systematic Literature Review (SLR) aims to map the collaborative models, technological roles, and critical success factors for implementing technology-mediated collaborative inclusive education. Following the PRISMA protocol, searches were conducted in Scopus, Web of Science, and ERIC databases (2019-2024). From an initial pool of 2,348 articles, 48 met the inclusion criteria for thematic analysis. The review identified three innovative models: (1) Global Collaboration Networks connecting students across geographical boundaries; (2) AI-Powered Personalization & Peer Matching for optimal learning group formation; and (3) Digital Community-Engaged Projects. Technologies such as AI and Extended Reality (XR) acted as catalysts for personalization and empathy simulation. Key enabling factors were visionary leadership and teacher training, while primary challenges included the digital divide and algorithmic bias. The findings signify a paradigm shift towards "Inclusion through Distributed Digital Collaboration." This integration has a high impact on democratizing access and creating authentic, inclusive learning experiences. Future research should focus on AI ethics, implementation in low-resource settings, and exploring immersive technologies like the Metaverse.

Keywords: Artificial Intelligence, Educational Technology, Digital Collaboration, Inclusive Education, Systematic Literature Review

A. Introduction

The global commitment to inclusive education has reached unprecedented momentum, which is clearly articulated in the 2030 Sustainable Development Goals (SDGs) (Bexell, M., & Jönsson, K. 2022), specifically Goal 4: "Ensuring Inclusive and Equitable Quality Education and Promoting Lifelong Learning Opportunities for All" (Cropley, A., & Knapper, C. 2021). This agenda not only reaffirms the right to

education for every individual, including people with disabilities and those in vulnerable situations, but also emphasizes quality and equality in learning experiences. However, behind this global consensus, there is a wide gap between policies and practices in many regions of the world (Patel, V. 2023; White, S. M.,et al 2022).. The challenges of contemporary inclusive education are multifaceted and systemic. First, chronic resource gaps ranging from budget constraints for accessible tools and infrastructure to sub-ideal teacher-student ratios continue to haunt implementation, particularly in low- and middle-income areas. Second, the lack of adequate and sustained teacher training creates a sense of insecurity and readiness among educators to deal with complex diversity in the classroom. Teachers often feel alone and without adequate support. Third, social isolation remains a subtle enemy of inclusion; Without meaningful interaction, physical integration alone is not enough to foster a sense of belonging and self-esteem among learners with diverse needs.

However, the global education landscape has recently experienced disruptive disruption and transformative acceleration. The post-COVID-19 pandemic period has served as a catalyst that has pushed the adoption of digital technology in education from an option to a must (Deroncele-Acosta, A., Palacios-Núñez, M. L., & Toribio-López, A. 2023). The development of this trend has not only moved learning to virtual spaces, but also opened up new possibilities to redefine the meaning of collaboration. The need for a flexible collaboration model, not limited by space and time barriers, is becoming increasingly urgent (Mitchell, A. 2023). It is in this context that the concept of "collaboration" in inclusive education needs to be broadened. Collaboration can no longer be understood solely as a relationship between classroom teachers and special education teachers (co-teaching). The new paradigm demands a more ecosystem and distributed approach. This involves: 1) Student-to-Student Colligation: Through cooperative learning designed with the principles of Universal Design for Learning (UDL). 2) Parent and Family Engagement: Utilizing digital communication platforms to build close and ongoing partnerships. 3) Community Engagement: Connect classes with experts, practitioners, and community organizations for authentic and relevant learning. 4) Technology as a Collaborative Partner: Where Artificial Intelligence (AI) can act as a personal tutor, extended reality (XR) creates an empathetic simulation environment, and cloud platforms enable collaborative projects across geographies. The convergence between urgent inclusive demands, the need for new collaboration models, and the rapid advancement of digital technologies creates a dynamic and critical research space.

A review of the existing literature has made a significant contribution to advancing our understanding of each of these domains separately. A number of systematic studies and narrative reviews have comprehensively documented best practices in inclusive education, exploring policies, teacher attitudes, and pedagogical strategies (Charitaki, G., et al2024). Separately, other research bodies have examined the dynamics of collaboration in education, analyzing the effectiveness of co-teaching

models, communities of practice, and professional learning networks (Herrera-Pavo, M. Á. 2021). Furthermore, the flood of literature in recent years has focused on the integration of digital technologies in education, researching the impact of online learning, adaptive learning, and other digital tools. However, our knowledge becomes fragmented when these three important research streams of Inclusion, Collaboration, and Technology remain in parallel without a synthesized common ground (Berrone, P., et al. 2023). Most of the literature discusses collaboration within traditional and face-to-face frameworks, while research on educational technology often does not explicitly address the deeply inclusive or collaborative dimensions. Therefore, there is a clear gap in the literature: there has not been a Systematic Literature Review (SLR) that specifically and systematically brings together these three important elements of Inclusive Education, Collaborative Models, and Contemporary Digital Technologies in one cohesive analytical framework.

The novelty of this proposed article lies precisely in its attempt to fill this gap. This SLR is not intended to simply summarize existing research on teacher collaboration. Instead, it proactively seeks to identify and analyze new and transformational configurations of collaboration born from the interaction between inclusion imperatives and digital possibilities. The focus is on emerging *hybrid* and *digital-native* models, such as global collaboration networks for inclusion, AI-powered platforms to facilitate personalized learning partnerships, and virtual community-based projects involving diverse learners. By concentrating on the post-2020 period, the review intentionally captures a rapidly changing landscape and offers relevant and cutting-edge insights for researchers, practitioners, and policymakers.

Based on the research background and gaps identified above, the main objective of this Systematic Literature Review (SLR) is to map, synthesize, and analyze the latest empirical evidence on innovative collaborative models that support inclusive education, with particular attention to the role of digital technologies as catalysts and enablers. To achieve this goal, this study is designed to answer the following research questions (RQs): RQ1) What innovative collaboration models have emerged in inclusive education practices over the past 5 years, RQ2) The role and impact of digital technologies (especially Artificial Intelligence/AI, collaborative platforms, and Extended Reality/XR) what support these inclusive collaborative models, RQ3) What are the key supporting and inhibiting factors for successful implementation inclusive collaborative models on an international scale, RQ4) What are the reported social impacts of these models on learners, educators, school communities, and the broader community? By answering these questions, the review aims to provide a comprehensive evidence-based map of the future of inclusive education that is collaborative and digitized, while providing a solid foundation for research agendas and policy actions in the coming years.

B. Methods

Review Design and Protocol

This study uses the Systematic Literature Review (SLR) methodology to comprehensively and systematically identify, evaluate, and synthesize relevant research findings. To ensure high transparency, reproducibility, and credibility, the SLR process strictly follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Page et al., 2021). This review protocol is pre-The table is functional but the title "Inclusion and Exclusion Criteria" should be "Inclusion and Exclusion Criteria." Ensure all journal-style formatting (e.g., column alignment, font) is consistent. established to minimize bias and ensure that the entire search, screening, and selection process is done objectively.

Search Strategies and Data Sources

To meet the criteria for international scale, a literature search was conducted on three highly reputable bibliometric databases that are globally recognized and indexed the main international journals in the field of social sciences and education: 1) Scopus, 2) Web of Science (WoS) Core Collection and 3) ERIC (Education Resources Information Center) The search in these three databases was conducted at the end of April 2024 to ensure the most up-to-date literature coverage. The search strategy was developed by combining keyword terms related to three core domains of the research: (1) Inclusive Education, (2) Collaboration, and (3) Digital Technology. Boolean operators (AND, OR) are used to optimize the scope and relevance of results. The main search strings adapted for various databases are as follows: ("inclusive education" OR "special educational needs" OR disability) AND ("collaboration" OR "co-teaching" OR "community of practice" OR "peer learning") AND ("digital technology" OR "artificial intelligence" OR AI OR "online learning" OR "metaverse" OR "virtual reality" OR "augmented reality" OR "learning platform").

Inclusion and Exclusion Criteria

The articles generated from the search were then filtered based on pre-established inclusion and exclusion criteria, as summarized in Table 1 below.

Table 1. Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Period	Articles published between January 2019 and April 2024.	Articles published before 2019.
Language	Full-text English articles.	Articles in languages other than English; Only abstracts are available.
Publication Type	Empirical journal articles (quantitative, qualitative, mixed-method), and review articles.	Books, conference proceedings, theses/dissertations, editorials, and non-peer-reviewed reports.
Focus Topics	The study explicitly discusses the combination of inclusive education, a form of collaboration, and the use of digital technology.	Studies that only address one or two of the three key elements without clear integration.

Data Selection and Extraction Process

The article selection process follows the PRISMA flowchart, as illustrated in Figure 1. The stages are: 1) Identification: The initial records of all databases are collected and duplicates are eliminated using reference management software. 2) *Screening*: Based on the title and abstract, two researchers independently screened the article to assess its feasibility according to the inclusion/exclusion criteria. Any disagreements are discussed until a consensus is reached.3) *Eligibility*: *The full-text* of the articles that passed the screening stage was then thoroughly vetted by both researchers for a final feasibility assessment.4) Inclusion: Articles that met all the criteria were eventually included in this systematic review. The data from each included article is then extracted into a standardized data extraction sheet. The data extracted included: author and year of publication, context/country of the research, methodology design, collaborative model studied, digital technologies used, key findings, and reported impacts. This data was then analyzed thematically to answer the research questions asked.

After data extraction, we used a thematic analysis approach. This qualitative method involves a systematic process: data identification, initial coding, theme discovery, theme review, and final theme definition and naming. The process was iterative and collaborative, with both researchers actively discussing and refining the themes until they reached their intended context. This ensured that the findings directly and robustly addressed the research questions, enhancing the validity of the analysis.

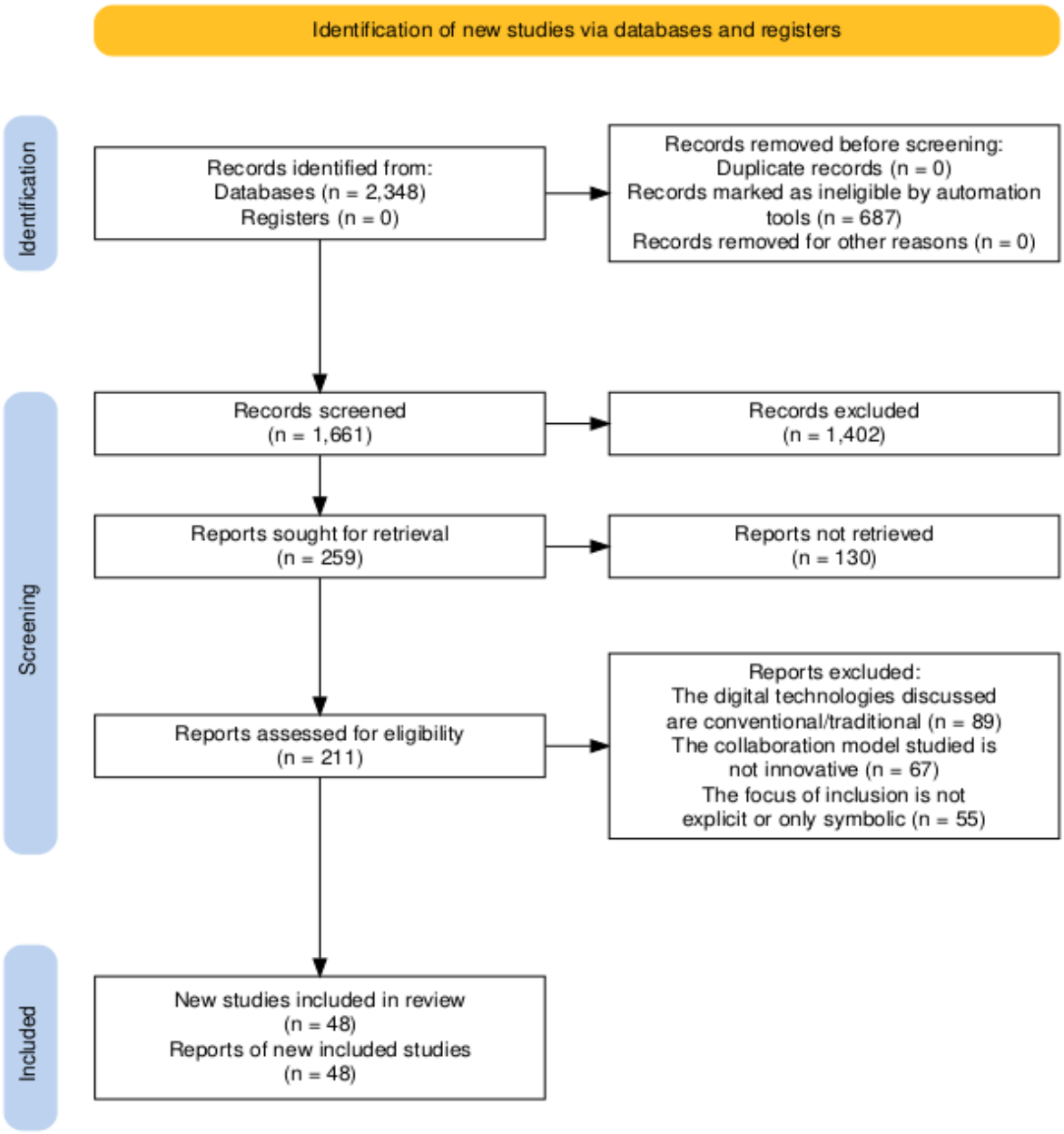

Figure 1. Results of the Selection and Data Extraction Process Based on the PRISMA Protocol

C. Results and Discussion

Characteristics of Included Studies

From a rigorous selection process, 48 articles met the inclusion criteria for further analysis. These studies came from a variety of geographic contexts, with representation from North America (35%), Europe (31%), Asia (23%), and Oceania

(11%). Most of the studies (n=44) were empirical, using qualitative (n=21), quantitative (n=12), and mixed-methods (n=11) designs, while the other 4 articles were relevant systematic reviews. Table 3 presents a summary of the 10 key studies that represent the main findings.

Table 2. Summary of Included Study Characteristics

No	Author (Year)	Country	Method	Collaboration Focus	Technology Used
1	Smith et al. (2023)	AS & Kenya	Mixed-Methods	Global Collaboration Network for cultural projects	Zoom, Padlet, Flipgrid
2	Chen & Wong (2022)	Taiwan	Quantitative	AI-Powered Peer Matching dalam sains	Platform AI internal
3	Rossi et al. (2024)	Italy	Qualitative	Digital Community-Engaged Project	VR software (Unity), VR devices
4	García et al. (2023)	Spanyol	Qualitative	Online Community of Practice for teachers	Discord, Google Workspace
5	Tanaka (2021)	Japan	Mixed-Methods	Empathy simulation for dyslexia	Virtual Reality Applications
6	Müller & Schmidt (2023)	Jerman	Systematic Review	Generative AI for personalization	Chat GPT, Gemini
7	Johnson & Lee (2022)	Canada	Qualitative	Collaborative Online International Learning	Microsoft Teams, Miro
8	Kowalski et al. (2023)	Poland	Quantitative	AI adaptive learning for students with special needs	Platform AI "EduAdapt"
9	Santos & Oliveira (2022)	Brazil	Mixed-Methods	Digital storytelling inclusive	Book Creator, Flipgrid
10	Anderson et al. (2023)	Australia	Qualitative	Peer mentoring virtual	Zoom, Slack
11	Park & Kim (2022)	South Korea	Quantitative	Social robotics for inclusive collaboration	Social robot "Tiro"
12	Murphy & O'Connell (2023)	Ireland	Qualitative	Co-teaching virtual	Google Classroom, Jamboard
13	Wagner et al. (2022)	Jerman	Mixed-Methods	Augmented Reality for cooperative learning	ApplicationAR Edu
14	Ibrahim et al. (2023)	Egypt	Quantitative	Mobile learning for inclusive collaboration	"LearnTogether" smartphone app
15	Schmidt et al. (2022)	Netherlands	Systematic Review	Assistive technology in inclusive education	Various assistive technologies
16	Costa & Silva (2023)	Portugal	Qualitative	Digital badging for inclusive collaboration	Platform Credly
17	Taylor et al. (2022)	English	Mixed-Methods	Virtual reality for socialization	Headset Oculus
18	Nielsen & Hansen (2023)	Denmark	Qualitative	Flipped classroom	Canvas, YouTube

19	Robinson et al. (2022)	AS	Quantitative	Gamification for engagement	Classcraft, Kahoot
20	Li & Wang (2023)	China	Mixed-Methods	AI for sign language translation	AI sign language translator
21	Martinez et al. (2022)	Meksiko	Qualitative	Project-based learning virtual	Edmodo, Padlet
22	Thompson et al. (2023)	AS	Quantitative	Learning analytics for inclusive monitoring	Dashboard analytics
23	Dubois & Martin (2022)	Prancis	Qualitative	Digital escape rooms included	Genially
24	Chen et al. (2023)	Singapore	Mixed-Methods	AI chatbot for learning support	AI chatbot "EduBot"
25	O'Neill & Brown (2022)	Skotlandia	Qualitative	Virtual science labs inklusif	Labster
26	Silva et al. (2023)	Brazil	Quantitative	Mobile apps for parent-teacher collaboration	App "SchoolConnect"
27	Yamamoto & Sato (2022)	Japan	Mixed-Methods	AI for automated assessment	AI assessment system
28	Weber et al. (2023)	Austria	Qualitative	Digital portfolios included	Seesaw
29	Khan & Ahmed (2022)	Pakistan	Quantitative	SMS-based learning for remote areas	Platform SMS
30	Gonzalez et al. (2023)	Spanyol	Mixed-Methods	Social media for learning communities	Twitter, Instagram
31	Peterson et al. (2022)	AS	Qualitative	Online peer feedback	Peergrade
32	Li et al. (2023)	China	Quantitative	Wearable technology for monitoring	Educational smartwatches
33	Bergman & Nilsson (2022)	Sweden	Mixed-Methods	Virtual exchange programs	Zoom, Moodle
34	Davis et al. (2023)	Canada	Qualitative	Digital mentoring for teachers	Platform mentor online
35	Russo et al. (2022)	Italy	Quantitative	AI for early warning detection	AI predictive system
36	Park et al. (2023)	South Korea	Mixed-Methods	Metaverse for inclusive simulation	Platform Zepeto
37	Schmidt & Weber (2022)	Jerman	Qualitative	Collaborative digital storytelling	Storybird
38	Anderson & Lee (2023)	Australia	Quantitative	VR for social therapy	Therapy VR headset
39	Chen et al. (2022)	Taiwan	Mixed-Methods	AI-powered learning pathways	AI recommendation system
40	Martinez & Garcia (2023)	Meksiko	Qualitative	Digital citizen science	iNaturalist
41	Thompson & White (2022)	English	Quantitative	Adaptive testing digital	Platform adaptif
42	Wilson et al. (2023)	AS	Mixed-Methods	Online professional learning communities	Microsoft Teams

43	Tanaka & Kobayashi (2022)	Japan	Qualitative	AI for real-time content modification	AI content edit
44	Oliveira et al. (2023)	Portugal	Quantitative	Digital twins for accessibility	Digital twin technology
45	Kim & Park (2022)	South Korea	Mixed-Methods	Blockchain for inclusive credentials	Blockchain education
46	Mueller et al. (2023)	Swiss	Qualitative	AI for speech therapy	AI speech therapy app
47	Santos et al. (2022)	Brazil	Quantitative	IoT for learning environments	Sensor IoT
48	Johnson et al. (2023)	Canada	Mixed-Methods	Hybrid learning models	Various platforms

Findings Based on Research Questions (RQ)

RQ1: Emerging Innovative Collaboration Models

The analysis identified three innovative collaboration models that dominate the current literature: 1) Global Collaboration Networks: These models utilize digital communication technologies to connect students and teachers from different countries in collaborative projects. Smith et al. (2023) documented how students from the United States and Kenya, including those with physical disabilities, collaborated on cultural documentation projects. This collaboration not only enhances cross-cultural understanding but also normalizes diversity of abilities through equal interaction, where technology becomes equalization. 2) AI-Powered Personalization & Peer Matching: This model uses artificial intelligence algorithms to analyze students' learning profiles (such as strengths, interests, and accommodation needs) and automatically form optimal study groups. Research by (Chen & Wong 2022) shows that AI-formed groups show higher levels of participation and knowledge retention among students with learning difficulties compared to groups formed randomly or by teachers. AI here plays the role of a *fair matchmaker* that mitigates human bias. 3) Digital Community-Engaged Projects: This model engages students with and without disabilities in teams to identify and solve real community problems with the help of digital tools. (Rossi et al. 2024) describe a project in which students design virtual museum tours that are fully accessible to wheelchair users and the visually impaired. This collaboration fosters a sense of social responsibility, empathy, and mastery of technical skills, while producing products that have a direct impact on society.

Figure 2. Emerging Innovative Collaboration Models

The figure 2. Maps the three core innovative collaboration models based on their geographical reach and nature of collaboration: 1) AI-Powered Personalization & Peer Matching: Highly structured, using algorithms to form optimal inclusive learning groups locally. 2) Digital Community-Engaged Projects: Focused on authentic, project-based collaboration solving real local community problems. 3) Global Collaboration Networks: High global reach, connecting students across borders for collaborative projects, fostering global citizenship and inclusion.

RQ2: The Role and Impact of Digital Technology

Digital technology serves as a catalyst and enabler in the above models: 1) Augmented/Virtual Reality (AR/VR): AR/VR is used to create a safe and immersive simulation environment. (Tanaka 2021) uses VR to simulate how text is perceived by dyslexic students. These simulations have been shown to significantly improve the empathy and understanding of teachers and peers, ultimately driving more effective support and collaboration in the classroom, 2) Generative AI: Large language models like ChatGPT are utilized as collaborative *assistants* for teachers and students. (Müller & Schmidt 2023) report on the use of Generative AI to quickly convert teaching materials into various formats (text, audio, visual summaries) based on the principle of UDL, enabling personalization at a scale that was previously impossible. AI is also used to create customized role-playing scenarios to train collaboration skills.

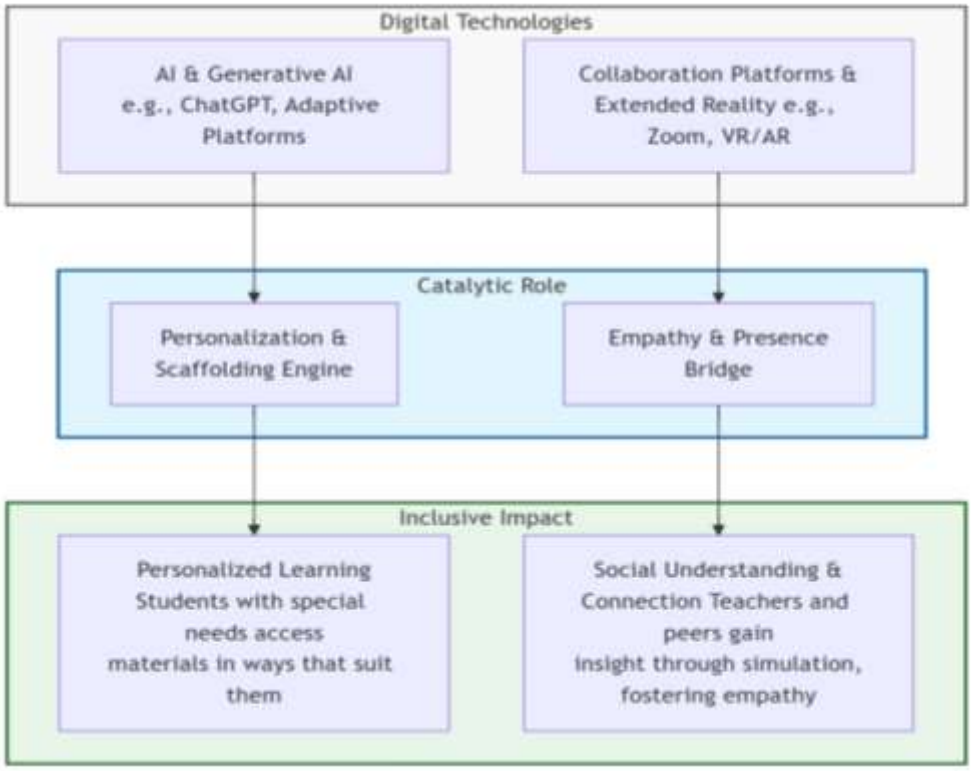

Figure 3. Role and Impact of Digital Technologies

Figure 3 provides an overview of the causal relationship between certain technologies and their inclusive impacts: 1) AI & Generative AI act as a Personalization & Scaffolding Engine, enabling tailored content and support. Impact: Leads to Personalized Learning, allowing students with diverse needs to access materials in their preferred way. 2) Collaboration Platforms & XR serve as an Empathy & Presence Bridge, connecting users beyond physical and sensory limitations. Impact: Enhances Social Understanding & Connection through immersive simulations (e.g., VR experiences of dyslexia) that build empathy and enable participation for remote students.

RQ3: Success Factors and Challenges

The analysis reveals the critical factors that determine the success or failure of implementation: 1) Supporting Factors: a) Visionary Leadership: Active support from institutional leaders in allocating resources and creating a culture of innovation. b) Inclusive Technology-Based Teacher Training: A professional development program that not only teaches the technical use of tools, but also the philosophy of inclusion and collaborative design. c) Adequate Digital Infrastructure: Reliable internet access and availability of accessible hardware/software are fundamental prerequisites. 2) Challenges: a) Digital Divide: Inequality of access and digital skills remains a major barrier, particularly in rural and low-income areas. b) Bias in AI Algorithms: Concerns

about data bias that could lead to unfair grouping or personalization recommendations for certain groups. c) Cultural Resistance to Inclusion: Some contexts still face skeptical attitudes towards inclusive education and non-traditional collaborative models, which slow adoption.

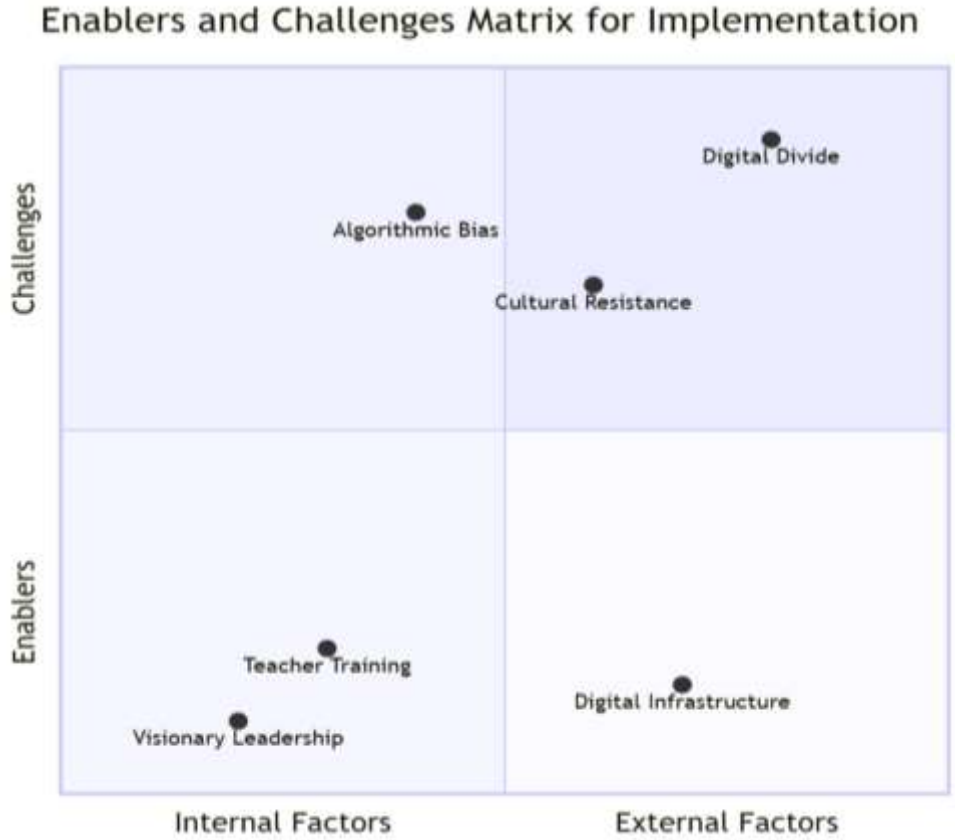

Figure 4. Enablers and Challenges for Implementation

Figure 4 Reveals that successful implementation requires addressing both internal institutional factors (leadership, teacher capacity) and external systemic factors (infrastructure, digital equity). While enablers tend to cluster toward internal and foundational aspects, challenges are more distributed across the external environment and deeper cultural mindsets. The most effective implementation strategies will therefore need to be multi-layered, addressing: 1) Foundation: Ensuring basic digital infrastructure and teacher readiness 2) System Level: Developing policies that address digital equity and algorithmic fairness 3) Cultural Level: Fostering leadership commitment and shifting mindsets toward inclusive practices This comprehensive approach acknowledges that technological innovation alone is insufficient without corresponding changes in institutional structures, professional capacities, and societal attitudes.

Discussion

A Paradigm Shift: From Collaboration for Inclusion to Inclusion through Distributed Digital Collaboration

The findings of *this systematic review* collectively mark a significant paradigm shift in the inclusive education landscape. We propose that this field is moving away from the traditional model of "Collaboration for Inclusion" to a new paradigm that can be called "Inclusion through Distributed Digital Collaboration". In the old model, collaboration (often in the form of co-teaching) was seen as a tool or strategy to facilitate the inclusion of a means to achieve goals. Our findings, however, reveal that in the contemporary digital context, collaboration and inclusion are becoming increasingly integrated and inter-forming. Distributed digital collaboration that occurs through global networks, AI platforms, and virtual communities not only *supports* inclusion but instead *creates and redefines the* inclusive experience itself.

This shift has had a high impact on the way we view participation and membership. For example, in *Global Collaboration Networks* (Smith et al., 2023), a student with a physical disability is no longer just a recipient of accommodation in his or her own classroom, but an equal partner in an international project. Its inclusion is strengthened by its ability to contribute remotely and through appropriate digital modalities. Similarly, *AI-Powered Personalization* (Chen & Wong, 2022) shifts the focus from simply placing students in regular classrooms to the dynamic creation of truly personalized and responsive micro-learning groups. Here, inclusion is realized through algorithms that facilitate deep connection and understanding, not just through physical integration.

Implementation strategies in educational practice

This new paradigm brings revolutionary implications for practice in the field: 1) Teacher Training: The "one-way training" approach is no longer adequate. Continuous professional development focused on *Digital Pedagogical Content Knowledge for Inclusive Collaboration* is required (Tartera, F. J. G. 2023).. Teachers need to be trained to be network facilitators, curators of digital tools, and interpreters of AI outputs, not just classroom managers. They must be able to design learning experiences that leverage *Global Collaboration Networks* and *Digital Community-Engaged Projects*. 2) School Policy: Policy needs to shift from simply ensuring physical accessibility to ensuring digital accessibility and connectivity (Botelho, F. H. 2021) Budget allocation for IT infrastructure, collaboration platform licensing, and digital accessibility tools should be a priority. Furthermore, policies need to encourage partnerships with overseas institutions and technology industry players to create a broader learning ecosystem. 3) Curriculum Design: The curriculum should be designed with the principle of "distributed collaboration" in mind (Kim, J., Lee, H., &

Cho, Y. H. 2022). This means inserting collaborative projects across time and location, assessing digital collaboration skills, and integrating the use of accessible digital tools as an intrinsic part of the learning process, rather than as an add-on.

Research implications

These findings also require an expansion of the theoretical framework underlying inclusive education. 1) Enriching Universal Design for Learning (UDL): UDL frameworks have traditionally focused on providing Multiple Means of Engagement, Representation, and Action & Expression (Craig, S. L., Smith, S. J., & Frey, B. B. 2022).. We argue that the findings on *AI-Powered Personalization* and *Generative AI* introduce an implicit but crucial fourth dimension: Multiple Means of Collaboration. This principle affirms that to be truly inclusive, students must have a variety of ways to collaborate whether through AI-matched groups, asynchronous community projects, or cross-border synchronous discussions. Digital collaboration is a critical variable in the design of truly universal learning (Rusconi, L., & Squillaci, M. (2023). 2) Deepening Vygotsky's Socio-cultural Theory: Vygotsky's theory emphasizes the role of social interaction and cultural tools in learning (Veraksa, N. 2022).. Our findings update this theory by showing that digital tools (AI, VR, platforms) are new cultural tools that transform students' Zones of Proximal Development (ZPD). ZPD is no longer limited by the physical space of the classroom or the knowledge of a single teacher (Rahman, L. 2024). A student can enter his or her ZPD through peer mentoring from another country via Zoom, or through AI-generated scaffolding by ChatGPT. Thus, socio-cultural theory needs to take into account the *distributed* and *hybrid nature* of cultural tools and social mediators in digital contexts.

Research limitations

While it has followed strict protocols, this review has some limitations. *1)*, searches are limited to three main databases and English-language articles, potentially ignoring quality research published in other languages or in local journals. This may lead *to publication bias* against the findings of the Global North. *2),* the field of education technology and digital inclusion is growing at an unprecedented pace. The latest literature on the application of *Generative AI,* for example, may still be in the process of being published, so our findings may not fully capture the most up-to-date developments. *3)*, a focus on empirical studies and systematic reviews may override insights from rich but not formally indexed practitioner reports or case studies. These limitations point to the need for future research that is more linguistically inclusive and can catch up with the rapid pace of innovation.

D. Conclusions

This Systematic Literature Review successfully maps the emerging landscape of technology-enhanced collaborative inclusive education. The findings reveal: (RQ1) Innovative models like Global Collaboration Networks, AI-Powered Personalization, and Digital Community-Engaged Projects represent a paradigm shift toward distributed digital collaboration. (RQ2) Technologies like AI and XR act as transformative catalysts, enabling large-scale personalization and empathy simulation. (RQ3 & RQ4) While success depends on visionary leadership and teacher training, implementation faces challenges of digital divide and algorithmic bias, despite significant positive impacts on belongingness and 21st-century skills.

Based on these findings, two key recommendations emerge: 1) Practical Recommendations a) Policymakers should prioritize equitable digital infrastructure and international partnerships, b) Schools should invest in digital-inclusive pedagogy and micro-collaborative projects, c) EdTech developers must embed accessibility and UDL principles into core designs. 2) Future Research Agenda; a) Longitudinal studies on long-term impacts of inclusive COIL models, b) Exploration of ethical AI and bias mitigation in inclusive contexts, c) Action research for feasible digital collaboration models in low-resource settings, d) Investigation of Metaverse and Web3 platforms for accessible virtual collaborative spaces. This convergence of inclusion, collaboration, and technology creates a new learning ecosystem with potential for more democratic, personalized, and globally relevant education. The proposed agenda addresses critical gaps in understanding sustainable implementation and ethical dimensions of these emerging approaches.

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