

DIGITAL LEARNING ENVIRONMENTS AS MEANS OF DEVELOPING SOCIAL SKILLS IN CHILDREN WITH SPECIAL EDUCATIONAL NEEDS

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Abstract: This paper examines how digital learning environments can function as structured and inclusive contexts for developing social skills among children with special educational needs in primary education. The purpose is to synthesize current educational research on the ways technology-mediated interaction supports communication, cooperation, emotional understanding, turn-taking, conflict resolution, and participation with peers, while also identifying conditions that enhance or limit effectiveness in inclusive classrooms. The methodology is a structured narrative literature review that draws on recent peer-reviewed studies and practice-oriented research in inclusive pedagogy, digital learning design, and social skill development; studies were selected to represent a range of digital modalities, including collaborative platforms, interactive learning games, digital storytelling, and guided online group tasks implemented within school settings. The results indicate convergent evidence that well-designed digital environments can promote social participation by increasing predictability, offering multiple modes of expression, and enabling scaffolded peer interaction through clear roles, shared goals, and feedback routines. Across studies, positive outcomes were most consistently associated with teacher facilitation, explicit social goal-setting, and the integration of social interaction into authentic learning tasks rather than isolated training activities. At the same time, findings underline that technology does not automatically generate meaningful social engagement; benefits were weaker when digital activities were individualistic, poorly structured, or disconnected from classroom relationships, and when educators lacked support to adapt tasks to diverse profiles of need. The paper concludes that digital learning environments are best understood as mediating tools that can extend inclusive participation when paired with intentional pedagogy, supportive classroom climate, and ongoing monitoring of peer dynamics. Recommendations emphasize designing collaborative tasks with clear interaction scripts, providing professional development focused on inclusive digital facilitation, ensuring equitable access to devices and connectivity, and combining digital interaction with planned face-to-face social opportunities to strengthen generalization across contexts.

Keywords: digital learning environments, social skills development, inclusive education, special educational needs, peer interaction.

1. INTRODUCTION

Developing social skills is a central educational priority for children with special educational needs because social participation shapes access to learning opportunities, peer belonging, and long-term well-being. In inclusive classrooms, social competence is not limited to “being sociable”; it includes communicating needs appropriately, collaborating toward shared goals, taking turns, interpreting social cues, regulating emotions during interaction, and repairing misunderstandings. However, many learners with special educational needs experience persistent barriers to reciprocal peer engagement, particularly when classroom interaction is fast-paced, ambiguous, or heavily dependent on implicit norms. These barriers can lead to reduced participation in group work, fewer peer friendships, and increased risk of social exclusion, even within formally inclusive settings (Niemi, 2024). As schools expand inclusion policies, the practical question is how to design learning environments that systematically support social interaction rather than assuming it will emerge naturally.

Digital learning environments have become a prominent candidate for addressing this challenge, not as a replacement for face-to-face relationships but as an educational medium that can structure interaction. Contemporary educational technology increasingly includes collaborative platforms, interactive learning games, virtual and augmented reality, and guided online group tasks that can be embedded in everyday teaching. Large-scale syntheses show that technology is widely used in inclusive education to reduce barriers, support participation, and personalize learning; yet the evidence also indicates that outcomes depend strongly on how technologies are selected, designed, and implemented within pedagogy (Navas-Bonilla et al., 2025; Samaniego López et al., 2025). From this perspective, “digital learning environments” are not neutral tools: they shape the visibility of peer contributions, the timing and pacing of interaction, the modes of expression available to learners, and the extent to which social participation is scaffolded.

A key rationale for focusing on digital environments is their capacity to increase predictability and provide multimodal communication pathways. For some learners, structured digital interfaces can reduce the cognitive load

associated with interpreting rapid social cues and can support communication through text, symbols, visual prompts, and guided feedback. Recent literature reviewing digital technologies for autistic children and adolescents highlights that technology can support social communication when it is aligned with developmental goals and situated within meaningful activity contexts rather than practiced as isolated drills (Jiang, 2026). In parallel, emerging work on technology-mediated collaboration among children with special educational needs emphasizes the importance of how collaboration is defined and measured, indicating that the field is moving toward more nuanced accounts of interaction quality, participation patterns, and shared task engagement (ACM, 2025). These developments suggest that digital learning environments may be particularly valuable when they are designed to make social interaction “teachable” through explicit roles, prompts, and collaborative routines.

At the same time, technology can reproduce or amplify exclusion if it is implemented without attention to classroom relationships, peer dynamics, and teacher facilitation. Evidence from inclusive group work shows that social inclusion can shift into subtle exclusion through interactional patterns, uneven participation rights, and unrecognized status differences, even when students are placed together in collaborative tasks (Niemi, 2024). Therefore, digital mediation should be evaluated not only in terms of access to devices or engagement with software, but also in terms of whether it creates equitable opportunities for reciprocal interaction and authentic peer membership.

The objective of this paper is to examine how digital learning environments can be used as educational means for developing social skills among children with special educational needs in primary education. Specifically, it explores which digital modalities are most frequently associated with social competence outcomes (for example, collaborative platforms, serious games, and immersive environments), which design and pedagogical features appear to support peer interaction, and which implementation conditions may limit or enhance effectiveness within inclusive classrooms. The overarching problem investigated is how schools can translate the promise of inclusive education into consistent, observable social participation, using digital environments as structured supports rather than as stand-alone solutions.

2. MATERIALS AND METHODS

This paper used a narrative literature review approach to describe and synthesize how digital learning environments support the development of social skills in children with special educational needs within school education. A narrative review was selected because it allows the integration of evidence from different study designs and educational contexts, offering a coherent account of key concepts, classroom practices, and emerging technology-supported approaches (Ferrari, 2015; Sukhera, 2022).

The materials for the review were journal articles and scholarly sources focusing on inclusive education, special educational needs, social skills development, and digital or technology-supported learning in primary and lower secondary school contexts. The review emphasized recent literature in order to reflect contemporary school realities, such as the increased use of digital platforms, interactive learning applications, and structured online collaboration in everyday teaching.

The method followed an iterative reading and synthesis process typical of narrative reviews. First, relevant studies were identified through targeted keyword searching in major academic databases and publisher platforms. Next, sources were read closely and organized into thematic areas aligned with the paper’s focus: (a) digital environments that structure peer interaction, (b) pedagogical strategies that scaffold social participation, (c) outcomes related to communication, cooperation, and self-regulation, and (d) classroom conditions that influence implementation, including the teacher’s facilitative role and the inclusiveness of peer dynamics. Throughout the writing process, themes were refined by comparing findings across studies and by linking digital design features (for example, multimodal communication options and structured collaboration) with reported social outcomes.

Because this is a narrative review rather than an experimental study, the emphasis was placed on transparent description of the synthesis and on presenting the literature in a way that supports educational interpretation and classroom application (Ferrari, 2015).

3. RESULTS

The narrative review indicated that digital learning environments supported social skills development mainly when they were used to *organize peer interaction* (for example, shared tasks, common goals, and visible contributions) rather than to provide individual practice in isolation. Across recent evidence syntheses in inclusive education, digital tools were reported to reduce participation barriers and to offer flexible ways for pupils with special educational needs to engage in classroom activities, including interaction with classmates (Navas-Bonilla et al., 2025; Samaniego López et al., 2025). In these sources, positive social outcomes were most often associated with structured classroom use, teacher guidance, and activities that required communication and cooperation, instead of simple “screen time” or self-paced work.

A recurring finding was that serious games were linked with improvements in selected social skill domains, especially among children and adolescents on the autism spectrum. The reviewed evidence reported that game-based interventions tended to support aspects of social communication and social understanding, particularly when games included clear social scenarios, repeated practice opportunities, and feedback that helped learners recognize socially appropriate responses (Carneiro et al., 2024). However, outcomes were not uniform across studies, and effectiveness varied depending on the quality of the game design and the extent to which gameplay was connected to real classroom interaction (Carneiro et al., 2024).

Digitally mediated social stories also appeared to have beneficial effects when delivered through structured digital platforms. A pilot randomized controlled trial reported improvements in behavioural outcomes that were maintained at follow-up, suggesting that digital delivery could support consistent implementation and stable exposure to the intervention content in school routines (Hanrahan et al., 2020). Related school-based work also reported that digital tools could help teachers deliver social story interventions with fidelity in typical classroom settings, and that improvements in targeted behaviours could be observed during the implementation period (Smith et al., 2020). Overall, the results suggested that the digital element supported practical delivery (for example, consistency and accessibility), while the social benefits depended on how clearly the stories were tied to the child's daily social demands.

The review further showed growing attention to technology-mediated collaboration as a distinct area, focusing on how digital systems shaped peer-to-peer interaction for children with special educational needs. Recent peer-reviewed work reported that collaboration was defined and measured in diverse ways, but many designs attempted to encourage turn-taking, joint attention, and shared problem solving through interactive interfaces and co-present activities (Taranu et al., 2025). This line of research suggested that the “social value” of a digital environment increased when the tool made collaboration visible, supported shared control, and prompted reciprocal responses.

Evidence also pointed to benefits from immersive and interactive technologies for social skills training, particularly virtual reality interventions in autism-focused studies. A systematic review reported that virtual reality interventions had positive impacts on social skills, with immersive formats being more suitable for more complex social skills, while simpler formats were more aligned with basic skills and structured practice (Yang et al., 2025). Although this evidence was mainly located in autism research, it reinforced a broader pattern: digital environments were more likely to support social competence when they created safe, repeatable spaces for practicing interaction, while still requiring meaningful social decision-making.

Finally, studies addressing socially assistive robotics suggested that social robots were used as mediators to facilitate engagement and social-emotional learning goals, often by eliciting responses, supporting attention, and providing structured interaction opportunities. Recent open-access research described classroom-relevant roles for social robots in supporting social-emotional skills and in enabling educators to focus on feedback and guided interaction (Arora et al., 2024). In the overall synthesis, teacher facilitation remained the strongest cross-cutting condition: digital environments were associated with more consistent social outcomes when educators set explicit interaction goals, structured peer roles, and integrated digital interaction into inclusive classroom routines rather than treating technology as a stand-alone solution (Navas-Bonilla et al., 2025; Taranu et al., 2025).

4. DISCUSSIONS

The findings of this narrative review suggested that digital learning environments could contribute to the development of social skills for children with special educational needs when they were used as interactional scaffolds within inclusive classrooms. Rather than acting as a direct “cause” of social competence, digital tools appeared to function as mediating structures that organized participation, reduced ambiguity, and created repeated opportunities for reciprocal exchange. This interpretation aligned with contemporary views of social competence as context-dependent and learnable through participation in meaningful activities, not only through isolated training. In practical terms, the reviewed evidence implied that the educational value of technology lay in its capacity to shape *how* children interacted, by making tasks more predictable, contributions more visible, and communication channels more accessible.

A key implication was that the strongest benefits emerged when digital activities were collaborative and teacher-facilitated. When educators framed tasks around shared goals and guided interaction through roles, prompts, and feedback routines, digital environments were more likely to produce social participation that resembled authentic peer engagement. Conversely, when technology was used mainly for individual practice, it often supported academic access but did not reliably foster reciprocity or peer belonging. This distinction mattered for inclusive education, because inclusion is ultimately measured not only by placement in the same classroom but also by the quality of social membership and interaction opportunities. Therefore, digital learning environments should be

evaluated for their capacity to produce equitable interactional opportunities, particularly for pupils who experience difficulties in turn-taking, joint attention, or emotional self-regulation.

The results also had significance for how schools conceptualize “transfer” of social skills. Digital interventions such as serious games, digitally delivered social stories, or immersive practice environments can support rehearsal and understanding, but classroom inclusion requires that skills generalize into everyday peer routines. The review indicated that transfer was more plausible when teachers explicitly linked digital activities to real situations, reflected with learners on social choices, and embedded practice in group tasks that required coordination. This suggested that digital environments worked best as part of a broader instructional ecology, where technology-based practice was connected to face-to-face interaction and reinforced across different settings and times. For school leaders, this placed emphasis on professional learning and on coherent classroom routines, because the tool alone did not guarantee socially meaningful outcomes.

At the same time, the review raised a caution about unintended consequences. Digital environments can simplify interaction, but they can also unintentionally reduce spontaneous social contact if they replace cooperative classroom talk with parallel screen engagement. In inclusive settings, where peer dynamics and participation rights are already sensitive, poorly structured digital use may preserve or deepen social distance. The broader significance of this point was that inclusive digital education should be designed around *participation goals*—who interacts with whom, under what conditions, and with what supports—rather than around technology adoption as an end in itself. Overall, the discussion supported a balanced conclusion: digital learning environments offered real potential for social skills development, but their effectiveness depended on intentional pedagogy, thoughtful design, and a classroom culture that values reciprocal participation.

5. CONCLUSIONS

This narrative review concluded that digital learning environments could support the development of social skills in children with special educational needs, primarily when they were used to structure meaningful peer interaction within inclusive classroom routines. The most consistent conclusion was that technology functioned best as a mediating tool that organized participation through clear tasks, shared goals, and accessible communication pathways, rather than as a stand-alone intervention. In this sense, digital environments contributed to social competence by reducing ambiguity, increasing predictability, and enabling multimodal expression, which helped some learners participate more actively and confidently in peer exchanges.

A second conclusion was that the social impact of digital tools depended strongly on pedagogy. Social skill gains were more plausible when teachers facilitated interaction, set explicit social participation goals, and used digital activities that required collaboration and reciprocity. By contrast, when digital use was mainly individual and self-paced, it tended to support engagement with learning content but produced weaker and less reliable improvements in peer-related outcomes. This finding reinforced a broader implication for inclusive education: social inclusion is achieved not only through access to curriculum and technology, but through sustained opportunities for belonging and reciprocal interaction. Finally, the review suggested that the main challenge for schools was ensuring that social learning supported digitally was transferred to everyday classroom life. Transfer appeared more likely when digital practice was connected to real situations, discussed reflectively, and combined with face-to-face cooperative activity. Overall, digital learning environments offered a promising pathway for strengthening social participation in inclusive education, but their effectiveness relied on intentional design, teacher guidance, and a classroom culture that protects and expands interactional opportunities for all learners.

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