

AI for Inclusion: A Systematic Review on Artificial Intelligence for Accessibility in Digital Games

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Abstract. *Context:* Digital games are an important site of social participation, learning, and inclusion. However, many games still lack accessibility features, and key disability groups remain under-served. **Problem:** Although Artificial Intelligence (AI) and games have been intertwined since the early days of computing, its use for accessibility remains under-documented. **Methodology:** To identify and analyze the use of AI applied to accessibility in digital games, we conducted a systematic literature review. We answer questions regarding how it is being applied, what accessibility needs are addressed, what techniques are used, and what gaps remain in the literature. **Preliminary results:** Of the 4 selected studies and 10 additional literature reviews, we found that the use of AI techniques for accessibility in digital games is still underexplored, with few categories of disabilities and AI techniques being employed.

Keywords Artificial Intelligence, Accessibility, Digital Games.

1. Introduction

Digital games have become an important site of social participation, learning, and inclusion. Accessibility is increasingly recognized as key dimension for ensuring that people with disabilities can fully engage in play experiences [Hassan 2024]. The game industry has made visible commitments to accessibility, through hardware such as adaptive controllers, software guidelines such as Microsoft Accessibility Guidelines [Game Accessibility Guidelines 2012, Microsoft 2023], and institutional recognition, such as the *Innovation in Accessibility* category at The Game Awards. However, many game titles still lack accessibility features, and research suggests that key disability groups (e.g., cognitive) remain under-served [Mota e Duarte 2025, Spiel e Gerling 2021]. Digital games differ from other interactive systems because they demand rapid sensorimotor responses, complex problem-solving, multimodal perception, and sustained engagement. Thus, accessibility in digital games extends beyond functional interaction to encompass

difficulty balance, narrative comprehension, emotional experience, player agency, among other aspects. This makes digital games a unique and demanding domain for accessibility research, where AI has the potential to enable forms of adaptation that traditional rule-based solutions may not be able to achieve.

This paper reports a systematic literature review of the last 5 years of publications addressing the intersection of artificial intelligence and accessibility in digital games. The period between 2020 and 2025 is particularly significant: during these years, generative AI models, reinforcement learning agents, and multimodal architectures became widely available, while the game industry increased its attention to accessibility design. These concurrent developments create a timely moment to assess how, and to what extent, AI has been leveraged to support accessible play in digital games. We seek to map how AI is being employed to support and transform accessibility in games and to highlight research directions and opportunities for innovation.

2. Background

Accessibility in Digital Games. Accessibility in the context of digital games refers to the design of hardware and software gestures that enable players with different abilities to fully engage with play experiences, encompassing visual, auditory, motor, and cognitive [Mota e Duarte 2025]. Existing guidelines frameworks have advanced awareness, but remain highly context-dependent and do not always specify which accessibility barriers they address [Hassan 2024]. As a result, advocacy groups continue to promote actionable, player-centered approaches that frame accessibility around access and adjustable challenge [AbleGamers 2018]. Research also shows that accessibility benefits extend beyond disabled players: studies on older adults highlight limited attention to accessibility compared to usability, underscoring the need for features integrated from the start of game design [Krishna et al. 2025].

Artificial Intelligence and Games. Artificial Intelligence refers to the study and development of computational systems capable of performing tasks such as reasoning, learning, planning, and perception [Russell e Norvig 2020]. AI research has historically used games as experimental domains, as they provide controlled, measurable, and yet complex environments to test decision-making and learning algorithms. Historically, classic board games, such as Chess, have helped drive advances in search, heuristics, and reinforcement learning, culminating in landmark achievements like AlphaZero [Silver et al. 2018]. As noted by [Yannakakis e Togelius 2025], the co-evolution of AI and games is reciprocal: AI techniques advance by being evaluated in games, while games themselves increasingly rely on AI for their core functionality.

Artificial Intelligence and Accessibility. AI has potential to enhance accessibility by adapting digital experiences to the diverse needs of users. In the field of Human-Computer Interaction (HCI), multimodal interfaces (those combining visual, auditory, and tactile feedback) have been shown to reduce cognitive and sensory barriers for people often marginalized by digital technologies [Ayushi et al. 2025]. According to [Dwyer et al. 2024], AI can improve game accessibility by automating complex or high-precision actions, reducing physical fatigue, and enabling alternative input methods such as eye-tracking and predictive assistance. However, AI systems may overlook disability-related needs, embed biases, and introduce dilemmas related to player autonomy, privacy,

and unintended consequences of partial automation, unless developed through co-design with players [Dwyer et al. 2024, Chemnad e Othman 2024].

3. Methodology

Our main goal in this systematic literature review is to address the intersection of the use of **Artificial Intelligence** applied to **Accessibility** in digital **Games**. We follow the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol [Moher et al. 2009] methodology and used three digital libraries: ACM Digital Library¹, SpringerLink², and Brazilian Computer Society OpenLib (SOL)³. The search was conducted in August 2025 and included publications between January 2020 and August 2025. The following search string was used, with slight adaptations to comply with each platform's search syntax (when supported by the platform, we limited the search to titles, abstracts, and keywords): ("games" OR "game") AND "accessibility" AND "artificial intelligence".

The inclusion and exclusion criteria are described in **Figure 1**. We want to look at the state-of-the-art by considering the last 5 years (IC1), but without losing our focus on digital games (IC5, EC1-3). Other criteria are related to academic rigor (IC2, EC4), our spoken languages in IC4, and full-text availability in IC3. We aim to answer the following research questions (RQ): **RQ1**: How has artificial intelligence been applied to improve accessibility in digital games? **RQ2**: Which accessibility needs are most addressed by AI solutions? **RQ3**: What AI techniques are most commonly used for accessibility in games? **RQ4**: What gaps remain in the literature, and what opportunities exist for innovation?

4. Results

From an initial set of 729 entries, after removing duplicates and screening titles, 41 publications were retained for abstract analysis. Among these, 4 directly addressed the use of artificial intelligence for accessibility, and 10 were literature reviews related to the topic. The details of the selection process are presented in **Figure 1**.

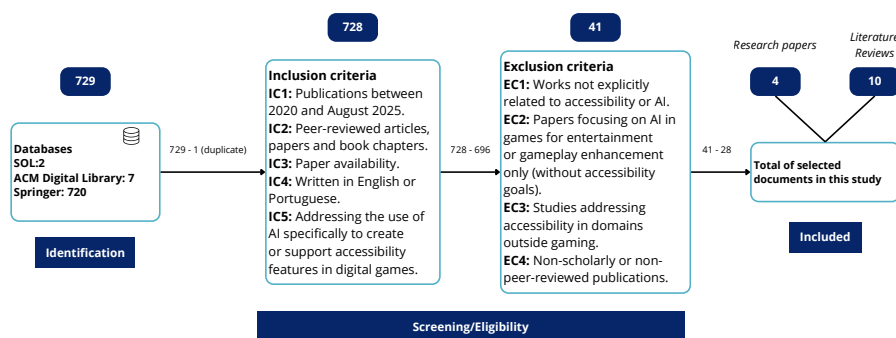


Figure 1. PRISMA flow diagram with inclusion and exclusion criteria.

Of the selected studies, [Cimolino et al. 2021] proposes adaptations to two games using partial automation to enhance accessibility for players with motor

¹<https://dl.acm.org/>

²<https://link.springer.com/>

³<https://sol.sbc.org.br/>

impairments, particularly those with spinal cord injury; [Aytemiz et al. 2020] presents game-playing AI (GPAI) agents as assistive tools for players with cognitive difficulties, introducing Ghost Mode and Point-and-Click mechanisms to support progression in a 2D platform game; [Pereira et al. 2024] develops an educational game for individuals with intellectual disabilities, integrating neural networks, pathfinding, and intelligent agents to dynamically adjust difficulty and support learning; and [Herrera et al. 2025] describes an immersive VR platform for rehabilitation of patients with spinal cord injury, using AI to dynamically adjust spatial layout and regulate user fatigue in real time. Within the selected studies, only two categories of disabilities were addressed: motor and cognitive. The cognitive dimension includes gameplay progression difficulties [Aytemiz et al. 2020] and intellectual disabilities [Pereira et al. 2024], while the motor dimension is focused on adapting digital games to support the rehabilitation of individuals with severe motor impairments [Herrera et al. 2025, Cimolino et al. 2021].

Regarding the AI techniques employed, two studies [Aytemiz et al. 2020, Cimolino et al. 2021] utilized the A* algorithm to compute optimal paths and deliver assistive behaviors that improve game accessibility. The results also reveal the use of partial automation (AI systems designed to support players in specific tasks) [Cimolino et al. 2021]; neural networks through a reinforcement learning algorithm, enabling the agent to adapt its actions based on player needs [Pereira et al. 2024]; and a General-Purpose Artificial Intelligence (GPAI) repurposed to function as a virtual assistant during gameplay, offering cognitive support to players [Aytemiz et al. 2020].

Literature Reviews. We found it relevant to select literature reviews [Guzmán et al. 2024, Silva et al. 2025, Mortazavi et al. 2024, Etxabe-Antia et al. 2025, Mota-Martínez e Rechy-Ramirez 2025, Moradzadeh et al. 2025, Boubakri e Nafil 2025, Huang et al. 2025, Privitera et al. 2025, Wang et al. 2024]. All were published between 2024 and 2025, reflecting a recent and growing academic interest in developing research focused on accessibility. Considerations primarily prioritize cognitive and physical aspects, with fewer discussions of visual or auditory needs. AI appears most frequently in the context of personalization and adaptivity, with a notable emphasis on serious games. Although many reviews discuss AI, accessibility, and digital environments, few works explicitly frame their contributions as “AI for accessibility in digital games”. Instead, accessibility tends to appear indirectly, through personalization, adaptivity, assistance, or rehabilitation, particularly in studies focused on serious or therapeutic games.

5. Discussion

This section synthesizes the results and examines implications for our research questions.

RQ1: How has artificial intelligence been applied to improve accessibility in digital games? Across the selected studies, AI focuses on reducing barriers through assistance and adaptive support, though predominantly rooted in medical, clinical or rehabilitative contexts. Literature reviews indicate that AI contributes to accessibility implicitly through personalization and dynamic difficulty adjustment, even without explicit accessibility labeling [Mortazavi et al. 2024, Guzmán et al. 2024, Wang et al. 2024]. This suggests that such technologies already permeate the game research ecosystem but remain under-recognized and fragmented under other terminologies.

RQ2: Which accessibility needs are most addressed by AI solutions? The selected

studies address only motor and cognitive accessibility, with no works addressing visual or auditory impairments. This prominence also reflects a prioritization of impairments that are easier to quantify or that align with clinical or rehabilitative pipelines [Chemnad e Othman 2024]. The literature reviews reinforce this pattern: even in broader application domains such as XR, VR rehabilitation, or gamified learning, visual and auditory accessibility efforts are addressed only superficially [Boubakri e Nafil 2025, Privitera et al. 2025]. This absence of AI-driven research for blind, low-vision, deaf, or hard-of-hearing players represents a gap and an opportunity for innovation.

RQ3: What AI techniques are most commonly used for accessibility in games?

The studies employed a small set of classical and modern AI techniques. Although these techniques support accessibility, their scope remains limited compared to the broader field of game AI, which has advanced in player modeling, generative AI, multimodal interaction, natural language interfaces, and adaptive narrative systems [Yannakakis e Togelius 2025]. Furthermore, none of these approaches appear in accessibility-focused research, revealing a disconnect between mainstream game AI innovation and the accessibility research agenda. Meanwhile, literature reviews highlight various AI techniques with strong potential to improve accessibility, such as multimodal personalization in XR and GAN-based procedural generation—methods that are rarely designed with accessibility as an explicit goal [Silva et al. 2025], and remain underutilized in projects addressing the needs of players with disabilities.

RQ4: What gaps remain in the literature, and what opportunities exist for innovation?

The results reveal gaps such as the lack of research on sensory accessibility (visual and auditory). Methodologically, the field also lacks robust evaluation frameworks capable of assessing the impact of AI assistance on player experience, autonomy, and enjoyment. An additional opportunity lies in reframing AI's role in game accessibility. Rather than focusing only on compensating for impairments or offering task-specific assistance, AI can support a broader, player-centered vision. The literature reviews reinforce these observations, emphasizing the absence of integrated evaluation frameworks that jointly consider accessibility, player experience, and AI adaptation [Guzmán et al. 2024, Etxabe-Antia et al. 2025]. Additionally, accessibility frequently appears as a secondary or implicit theme, rather than as a central research priority.

6. Conclusion and future directions

This review presents preliminary results that highlight the gap between AI's potential and its limited practical application for accessibility in digital games. This gap is reflected in the predominance of literature reviews over primary studies and a concentration on clinical models of disability, which often neglect sensory needs. As an immediate next step, we recognize the need to employ broader search terms, such as “adaptive systems”, “personalization”, and “player assistance” to capture relevant works that may not explicitly use the term “accessibility”. Future work aims to establish a unified taxonomy and promote co-design with players with disabilities, moving toward a biopsychosocial model where AI fosters a truly inclusive and autonomous gaming experience.

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