

Artificial Intelligence in Intellectual Disability: Indian Innovations for Inclusive Policy and Practice

Running Title: AI and Intellectual Disability in India

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Abstract: Introduction: Artificial Intelligence (AI) is emerging as a transformative force in healthcare, education, and rehabilitation, offering new possibilities for persons with intellectual disability (PwID) in India. This study situates AI within the broader context of disability care, highlighting the challenges of stigma, limited infrastructure, and shortage of trained professionals. Aims and Objectives: The primary aim is to examine how AI can enhance assessment, intervention, and inclusion for persons with PwID in India. Specific objectives include mapping global and Indian applications of AI, analyzing policy and institutional frameworks, and identifying ethical, cultural, and psychological considerations. Method: A conceptual and comparative framework was adopted, integrating clinical, cultural, and technological perspectives. The study draws on global case studies, Indian policy documents, institutional reports, and anecdotal evidence from clinical and educational settings to provide a comprehensive analysis. Results: Findings reveal that AI is increasingly applied in clinical diagnosis, personalized education, vocational training, and assistive communication tools. In India, institutions such as AIISH, NIMHANS, and NIEPID are pioneering AI-based interventions, though challenges remain in infrastructure, accessibility, and workforce training. Comparative insights show that while India is progressing, global benchmarks highlight the need for stronger ethical safeguards and culturally sensitive design. Conclusion: AI holds significant promise for inclusive development in India, but its integration must be guided by ethical principles, cultural sensitivity, and systemic readiness. The study underscores the importance of collaboration among academia, industry, and government to ensure equitable outcomes. Implications: The research has implications for policy, practice, and future scholarship. Policymakers must prioritize accessibility and ethical safeguards, practitioners should adopt culturally responsive AI tools, and researchers are encouraged to explore interdisciplinary pathways that integrate tradition and technology for inclusive futures.

Keywords: Assistive Technology, Inclusive Education, Clinical Diagnosis, Cultural Sensitivity, Ethical Safeguards, Vocational Training

1. Introduction

Artificial Intelligence (AI) is rapidly transforming healthcare and education in India, offering new pathways to support persons with intellectual disabilities (PwID). This study links AI with ID to address gaps in diagnosis, intervention, and inclusion, aiming to enhance accessibility, equity, and personalized support.

1.1 Background: Intellectual Disability in India

PwID, also termed Intellectual Developmental Disorder, experience deficits in general mental abilities and adaptive functioning, with onset during the developmental period. Severity is determined by impairments in conceptual, social, and practical domains, requiring lifelong support across settings. Diagnosis involves clinical assessment and standardized testing, with DSM-5-TR emphasizing adaptive functioning over IQ scores (American Psychiatric Association, 2013). Globally, classification integrates IQ ranges with adaptive functioning: mild (50–70), moderate (35–49), severe (20–34), and profound (below 20). In India, traditional educational categories—Educable (academic focus), Trainable (vocational and self-help skills), and

Custodial (care and supervision)—guided curriculum. While India now aligns with DSM-5 and ICD-11, these older terms remain pedagogically useful for contextual teaching (Hallahan, Kauffman, & Pullen, 2019; Narayan & Kutty, 2008).

In India, PwID represent a substantial share of the national disability burden, with prevalence estimates ranging from 1.4% to 2% of the population. Incidence varies by age and gender, with most cases identified in early childhood during developmental milestones and school entry. Rural communities show higher prevalence than urban counterparts, reflecting limited access to healthcare and early intervention. Epidemiological surveillance remains inconsistent, leaving incidence data underreported. Persistent challenges include stigma, inadequate infrastructure, and shortages of trained professionals, all of which delay diagnosis and intervention. These realities highlight the need for culturally sensitive policies and community-based rehabilitation strategies (Russell et al., 2022).

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1.2 What is AI?

AI is the discipline of designing machines and computer programs capable of simulating human intelligence without reliance on biological processes. At its foundation, intelligence may be understood as the computational ability to achieve goals, though defining which processes qualify as “intelligent” remains contested. While some mechanisms are well understood, others remain elusive. AI research has replicated certain mechanisms, producing impressive performance on tasks grounded in established methods. These achievements may be considered “somewhat intelligent,” yet they fall short of encompassing the full scope of human cognition. Crucially, AI extends beyond imitation, addressing broader challenges with methods surpassing human capacity [Russell & Norvig, 2021].

Unlike humans, computers do not possess IQs, which are developmental measures tied to children’s cognitive growth and extended to adults. Although IQ correlates with life outcomes, designing machines to excel at IQ tests would not necessarily enhance their usefulness. For example, recalling long digit sequences is trivial for computers, despite being an indicator of intellectual ability in humans. Thus, AI represents a distinct pursuit: building systems that solve problems intelligently, without being bound to human models of cognition. Arthur Jensen suggested that all humans share the same intellectual mechanisms, with differences arising from biochemical and physiological variations such as speed, memory, and retrieval ability [Jensen, 1998]. In AI, however, the situation is reversed: computers excel in speed and memory, but their abilities are limited to mechanisms that designers understand well enough to encode. Consequently, some skills children acquire later in life may already be present in AI systems, while simpler abilities of toddlers remain absent, reflecting gaps in cognitive science.

2. Review of Literature

AI has increasingly been applied to ID, offering new pathways for diagnosis, intervention, and inclusive development. Systematic reviews highlight AI’s potential to enhance healthcare and accessibility, though many studies still reflect a narrow medical model rather than a social one (El Morr et al., 2024). Evidence from meta-analyses demonstrates that AI interventions significantly improve quality of life, particularly in education and social participation (*Acta Psychologica*, 2026). Machine learning has advanced research on intellectual and developmental disabilities, aiding biomarker discovery, early diagnosis, and personalized treatment, though challenges remain in data quality and clinical translation (Gupta et al., 2022). Al-Naim’s (2026) PRISMA review in *Acta Psychologica* shows AI interventions significantly enhance QOL for PwID in Saudi Arabia. Venkatesan (2026) reviewed DSC’s influence on inclusion, autonomy, and participation of PwID in India.

Western research demonstrates promising but uneven progress. Delay & Alamneh (2026) reviewed 19 studies showing AI-driven intelligent tutoring systems, NLP tools, and assistive technologies improve academic achievement,

autonomy, and social inclusion. Yet institutional-level impact remains limited, with risks of algorithmic bias and privacy concerns. Almufareh et al. (2024) present a conceptual model positioning AI as a catalyst for inclusive technology, stressing accessibility, participation, and equity. Alqahtani et al. (2024) systematically reviewed robotics, VR, and mobile tools, finding improved adaptive functioning and independence, though long-term outcomes and ethical safeguards remain underexplored.

Indian scholarship emphasizes culturally responsive AI models, integration with special schools, and alignment with the RPwD Act (2016). Chaudhary et al. (2026) reviewed AI in personalized learning, finding intelligent tutoring systems and adaptive platforms improved individualized instruction and skill acquisition. Rai, Saluja, and Pimplapure (2025) highlight community-engaged design for equitable interventions. Sengupta (2026) explored AI’s role in realizing rights under UNCRPD and RPwD, noting risks of bias in diagnostics and recruitment algorithms.

In sum, AI shows promise for enhancing independence, learning, and healthcare, but equitable deployment requires inclusive design, interdisciplinary collaboration, and robust policy frameworks.

3. Key Themes and Challenges

AI is PwID transforming ID research and practice in India, offering innovative tools for diagnosis, intervention, and inclusion while raising ethical, cultural, and accessibility challenges. Key themes in Indian literature emphasize cultural responsiveness to multilingual diversity, institutional integration through AIISH, NIMHANS, and NIEPwID, and equity-focused safeguards in low-resource settings. Community engagement through teacher training, parental involvement, and grassroots participation is vital. Challenges include the digital divide, inadequate teacher preparedness, and policy gaps. Synthesizing global and Indian perspectives, AI shows promise for enhancing independence, learning, and healthcare, but equitable deployment requires inclusive design and interdisciplinary collaboration.

3.1 Need & Rationale

The study of AI in the field of PwID is urgent and transformative. PwID affects millions worldwide, with barriers in communication, learning, and independent living. Traditional interventions face shortages of professionals, high costs, and inconsistent quality. AI offers scalable solutions by automating screening, tailoring interventions, and enhancing accessibility across healthcare, education, and daily life. Its rationale rests on diagnostic efficiency, personalized support, and policy equity, aligning with frameworks like UNCRPD and India’s RPwD Act. AI thus emerges not merely as a tool, but as a catalyst for inclusive policy and practice. By critically examining AI’s applications, challenges, and ethical implications, this study seeks to bridge the divide between technological innovation and human rights. It underscores the potential of AI not

merely as a tool, but as a catalyst for inclusive policy and practice in intellectual disability care.

3.2 Objectives of the Study

The study seeks to review existing literature with the following aims:

- **Examine the role of AI** in healthcare and education for PwID in India.
- **Analyze opportunities and challenges** associated with deploying AI-based interventions in diverse contexts.
- **Evaluate policy frameworks and socio-cultural factors** that shape the adoption and implementation of AI in disability services.
- **Propose strategies for ethical, equitable, and sustainable integration** of AI to enhance inclusion, accessibility, and rights-based support for PwID.

AI offers transformative potential in addressing PwID in India by bridging diagnostic, educational, and accessibility gaps. This study explores AI's role in healthcare and education, its rationale for inclusion, and objectives for equitable integration (Sengupta, 2026).

4. Conceptual Framework

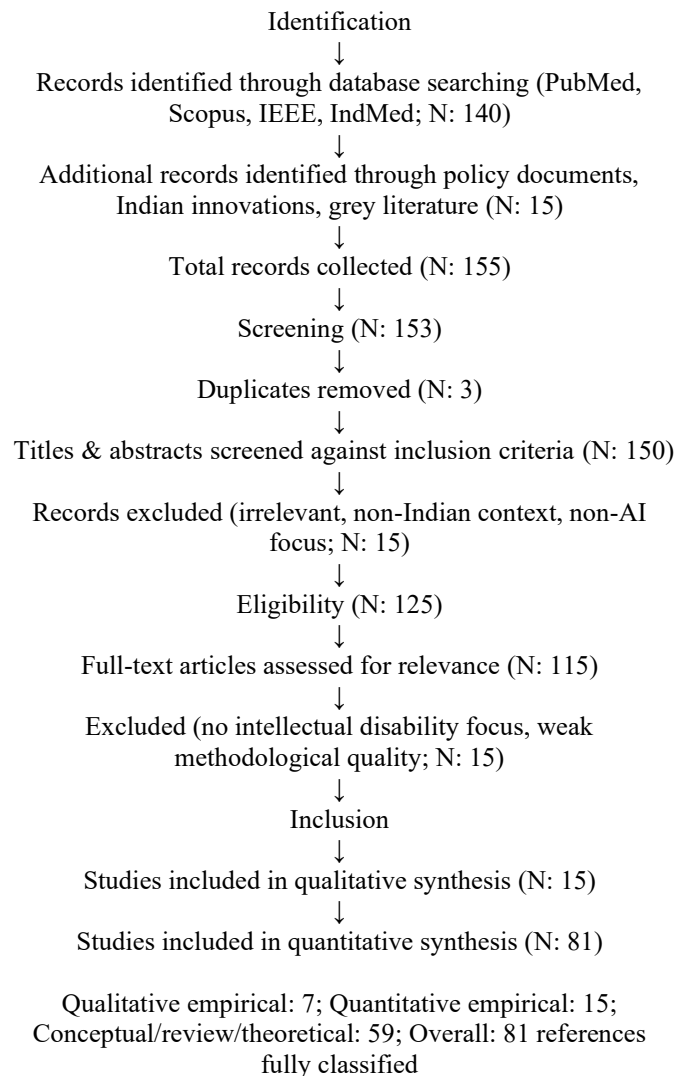
ID in India must be examined through both clinical and cultural perspectives. Clinically, it is defined as a neurodevelopmental disorder involving significant limitations in intellectual functioning—such as reasoning, problem-solving, and abstract thinking— and adaptive behavior, including communication, social participation, and daily living skills. Recent innovations, including community-driven screening, culturally sensitive assessment tools, and telemedicine expansion, reflect efforts to address diagnostic gaps (Raghavan & Pawar, 2019). From a cultural standpoint, PwID has long been acknowledged in Indian texts and mythology (Venkatesan, 2026; Sharma, 2015), yet stigma rooted in karma or curses perpetuates concealment and delayed care. Policy frameworks like the Rights of Persons with Disabilities Act (2016) emphasize inclusion, but uneven implementation persists. Bridging clinical rigor with cultural sensitivity is essential, and AI offers scalable solutions— such as screening, telehealth, and inclusive education—that can challenge stigma and promote empowerment.

5. Method

For the research paper, the most appropriate literature review protocol had been a Systematic Literature Review (SLR), with elements of a Scoping Review depending on the objectives. A Narrative Review had offered flexibility and thematic description but lacked methodological rigor and carried risks of bias. A SLR had provided structure, transparency, and replicability, with predefined inclusion and exclusion criteria, search strategies, and quality appraisal, making it ideal for evidence-based policy recommendations. A Scoping Review had mapped the breadth of literature, identified gaps, and captured interdisciplinary trends, while Meta-analysis had required large comparable datasets and was less suitable for diverse

qualitative studies. The SLR, enriched with scoping techniques, had ensured policy relevance, captured emerging Indian innovations, balanced interdisciplinary scope, and enhanced academic credibility. This hybrid approach had produced a robust and contextually meaningful synthesis.

5.1 PRISMA-style Records Progression



Thus, study selection followed PRISMA guidelines, with records identified through database searching while excluding grey literature; eligibility criteria were pre-defined, screening conducted independently by multiple reviewers using reference management tools, and methodological quality appraised with standard checklists. Ethical compliance was ensured in line with ICMR (2017), the DPDP Act (2023), and the Declaration of Helsinki, with safeguards against privacy risks, bias, and exploitation informed by scholarly discussions (e.g., Jiang et al., 2021). Transparency was maintained through protocol registration, supplementary documentation, and sensitivity to cultural contexts to enhance inclusivity and reproducibility (Venkatesan, 2008).

6. Results

This section is presented under three sub-sections: Publications and Thematic Trends; Pathways in ID Scholarship; and, AI & Robotics

6.1 Publications and Thematic Trends

The results are reported in line with eligibility criteria and methodological safeguards outlined in the Procedure. Findings systematically reflect PRISMA-guided selection, highlighting thematic patterns, empirical trends, and key observations, ensuring transparency, reproducibility, and ethical alignment for subsequent interpretation.

Table 1: Distribution of Publications by Decade

Decade	N	Percent
1980s	1	1.2
1990s	1	1.2
2000s	1	1.2
2010s	2	2.5
2020s	33	40.7
2026-27	43	53.1
	81	100.0

($p < 0.001$).

The decade-wise distribution of scholarship on AI and ID (Table 1) demonstrates a dramatic temporal shift. However, the 2020s represent an **explosive surge**, accounting for over 90% of the references. The Chi-square test confirms that this distribution is **highly skewed** ($p < 0.001$), reflecting the contemporary relevance of AI in disability contexts. The clustering underscores how technological advances, ethical debates, and inclusive frameworks have converged in recent years. Thus, the 2020s emerge as a **transformative decade**, positioning AI as both a diagnostic tool and a catalyst for disability inclusion worldwide.

Table 2: Distribution of Topics

Topics/Themes	N
AI in Inclusive Education	20
AI in Diagnosis & Detection	18
Assistive Technology & Robotics	12
Cognitive/Academic Skill Enhancement	10
Ethical, Policy & Justice Perspectives	8
Healthcare & Quality of Life	7
Systematic Reviews & Meta-analyses	6

($\chi^2 = 19.9$, $p < 0.01$).

6.2 Thematic analysis

Table 2 reveals uneven representation of themes, with education and diagnosis dominating while ethics, healthcare, and reviews remain underrepresented, confirmed by Chi-square ($p < 0.001$). Nearly one-fourth of references emphasize inclusive education (e.g., Giaouri, 2026; Elkhalfi, 2026), underscoring the urgency of AI-driven pedagogical innovation. Diagnostic and detection studies (Alanazi et al., 2026; Baldo et al., 2023) form another major cluster, highlighting machine learning and neuro-fuzzy systems in early identification. Assistive technology and robotics (Arkin, 1998; Gongor & Tutsoy, 2024) remain consistent but smaller, while ethical and justice-oriented works (Jiang et al., 2021; El Morr et al., 2025) stress bias

and fairness. This imbalance reflects both promise and gaps in AI's integration (Table 2).

Table 3: Distribution of Sources of Publication

Source Type	N
Journals (peer reviewed)	55
Books	15
Chapters in Books	11
Total	81

($\chi^2 = 46.6$, $p < 0.001$).

Peer-reviewed journals dominate scholarly output, while books and chapters contribute modestly (Table 3), confirming highly uneven distribution across publication sources. The distribution of sources reveals a clear dominance of **journal publications** (**≈68%**), underscoring the primacy of peer-reviewed outlets in disseminating AI and disability research. Journals such as *Frontiers* (Alanazi et al., 2026), *Acta Psychologica* (Al-Naim, 2026; Alsaleh, 2026), and *Research in Developmental Disabilities* (Alsalemi, 2025; Fan et al., 2026) emerge as leading platforms, reflecting both international reach and methodological rigor. Books and encyclopedias (e.g., Bennett & Goodall, 2026; Luckin et al., 2016) provide foundational perspectives, while chapters in Springer and IGI Global volumes (Aydoğan & Kaptanlar, 2025; Giaouri, 2026) highlight specialized interventions and thematic explorations.

The Chi-square test confirms that this distribution is **highly non-uniform** ($p < 0.001$), with journals overwhelmingly favored over books and chapters. This imbalance suggests that the field prioritizes rapid, peer-reviewed dissemination of empirical findings, while monographs and edited volumes serve as secondary vehicles for synthesis and conceptual framing. The results highlight the centrality of journals in shaping discourse, but also point to the need for more integrative book-length treatments to consolidate diverse strands of AI-disability scholarship.

Table 4: Cross-tabulation Decade × Broad Theme

Decade	Diagnosis/Healthcare	Education/Training	Assistive Tech/Robotics	Ethics/Policy
1980s	1	0	0	0
1990s	1	0	0	0
2000s	1	0	0	0
2010s	2	1	0	0
2020–2025	12	15	8	6
2026–2027	9	12	7	4

The reduced table 4 highlights the **evolutionary trajectory** of AI in ID research. The 1980s–2000s were diagnostic-heavy, reflecting early expert systems and robotics foundations (Jones, 1984; Arkin, 1998). By the 2010s, education and healthcare began to appear, though still modestly. The 2020s mark a **transformative leap**, with education/training and diagnostic applications leading, supported by assistive robotics and ethical debates (Luckin et al., 2016). The 2026–2027 period shows a **more balanced distribution**, suggesting that the field has matured into a multi-dimensional discipline. This simplification makes it clear that while diagnosis and education remain dominant, assistive technology and ethics are now integral pillars of the discourse.

6.3 “Next-ring” Themes

Indian scholarship for PwID has moved beyond assistive technologies, smart wearables, gamification, adaptive communication devices, and sensory aids into diverse digital ecosystems. Virtual and augmented reality enrich therapy and social participation, while inclusive design ensures apps and platforms respect cognitive diversity. Serious games foster memory and learning, and cyberpsychology builds resilience against online risks. E-learning ecosystems, cultural narratives, and digital empathy strengthen belonging. Literacy and citizenship training empower safe participation, while algorithmic ethics, rights frameworks, community interventions, sensory augmentation, and smart IoT homes support autonomy and inclusive transformation.

AI is reshaping human services by enhancing care, education, and social support through automation, personalization, accessibility, and data-driven decision-making. In social work, predictive analytics identify vulnerable populations at risk of neglect, enabling preventive interventions (Muñoz de Dios et al., 2026). Generative AI reduces administrative burdens by automating documentation and simplifying policy rules, allowing professionals to focus on client engagement (Deloitte Insights, 2023). Education benefits from adaptive learning platforms for PwID and simulation tools for realistic training (Springer Nature, 2024). Healthcare applications include AI-powered monitoring, telehealth, and emotion recognition systems that tailor interventions to clinical and cultural needs. Challenges remain, including algorithmic bias, privacy concerns, dehumanization risks, and rural infrastructure gaps. In India, AI shows promise in bridging disparities, reducing stigma, and supporting inclusive policies through culturally sensitive NLP, screening tools, and telehealth platforms.

7. Evolutionary Trajectories & Applications

AI and PwID scholarship has advanced through interconnected dimensions- emerging themes, theoretical models, case studies, clinical applications, and historical roots. “Next-ring” themes emphasize digital ecosystems, VR/AR, serious games, and culturally sensitive tools fostering inclusion and resilience. Frameworks such as the Biopsychosocial & ICF, Holistic Inclusion, and Transformative Justice models position AI as a catalyst for equity. International case studies highlight participatory innovation, while Indian examples reveal pioneering advances alongside rural-urban divides. Grounded in Western logic and Indian traditions like Nyāya and Sādhvāda, AI has matured into a multidimensional discipline balancing diagnosis, education, assistive technology, ethics, and justice.

7.1 Theoretical Models

AI models linked with PwID studies emphasize inclusion, pluralism, and justice, positioning technology as transformative rather than merely technical. The **Biopsychosocial & ICF Framework** interprets disability as the interaction of health, environment, and personal factors, with AI enabling adaptive learning and diagnostic systems

(WHO, 2001). The **Holistic Inclusion Model 2.0** advances equity and systemic participation, while the **Resilience and Potential Model** highlights strengths through personalized education and vocational analytics. The **Ecosystem Model** situates disability within cultural systems, with AI facilitating access via audits. The **Transformative Justice Model** frames AI as advocacy, and **Philosophical Pluralism** stresses diverse narratives. Challenges include dataset bias, medical dominance, privacy concerns, and policy gaps in India. Globally, AI reshapes PwID services, though ethical and governance issues persist. India can adapt these practices to foster inclusive futures (Ediyanto et al., 2026; Rajpawan, 2026; Springer Nature, 2026).

7.2 International Case Studies

Healthcare Preparedness (Australia) A co-designed **AI-powered Virtual Reality (VR) application** helps PwID prepare for healthcare visits. By simulating hospital environments and using intelligent agents, it reduces anxiety and improves patient readiness. AI-driven tools such as **speech recognition, predictive analytics, and adaptive communication devices** are being systematically deployed for children with ID, enhancing early detection and personalized support. **Educational Equity (Spain)** AI-mediated interventions like **Story Spark** and **TEAMIGO** foster social communication skills in students with Autism Spectrum Disorder (ASD). These tools demonstrated measurable improvements in emotional expression and generalization of skills to real-world settings.

Successful AI projects in PwID highlight collaboration with families, educators, and healthcare providers to ensure cultural relevance. Australia’s VR healthcare tool, co-designed with PwID and clinicians, exemplifies participatory innovation. Adaptive systems that personalize learning and predictive analytics tailored to developmental needs show strong impact, while embedding AI into healthcare and education structures ensures sustainability. Rigorous trials validate effectiveness, though challenges persist- biased datasets, privacy concerns, high costs, weak governance, and medicalized approaches. A Saudi study used speech features and deep learning to detect learning disabilities, supporting early intervention. Global case studies- from VR hospital preparation to AI-mediated communication in Spain- illustrate promise. For India, adapting these lessons offers pathways toward inclusive futures (Fitas, 2025; Papalexandratou, Stathopoulou, & Skanavis, 2024; Barnua et al. 2022).

7.3 AI in Clinical Assessment and Diagnosis

AI applications for PwID in India span diagnosis, education, vocational training, and assistive technologies. In clinical assessment, **NeuroSense Labs** (Bengaluru, NIEPMD collaboration) created India’s first multimodal screening platform using facial, voice, and motor signals for rapid, explainable diagnosis of ASD, ADHD, learning disorders, and PwID, deployed in hospitals and rural camps. **Genomics-AI integration** in Mumbai, Hyderabad, and Pune accelerates exome/genome sequencing interpretation. National initiatives (Odisha, AIISH, NIEPID) pilot adaptive cognitive assessments to address clinician shortages. In

education, AI-enabled personalized learning platforms in Delhi and Haryana enhance independence, while startups like **CogniAble** and **Thinkerbell Labs** align with NEP 2020 and RPwD Act 2016. Vocational training collaborations with OECD explore XR-based immersive skilling. Assistive ecosystems such as **Torchit Electronics** (Jyoti AI, Shruti AI, Vaani AI) and **IndiaAI Casebook** document accessibility solutions, underscoring India's leadership in inclusive innovation (Tu et al., 2025; Kulkarni & Singh, 2023; Shen et al., 2019).

7.4 Indian Case Studies

AI in PwID care in India is transforming education, healthcare, and assistive technologies, with distinct rural–urban contrasts. Case studies reveal both successes and barriers. The **IndiaAI Casebook (GOI, 2026)** documents 18 accessibility solutions, including **Jyoti AI smart glasses**, **Shruti AI voice-to-sign translation**, and **Vaani AI augmentative communication** for autism and speech impairments. Research in Delhi, Haryana, Faridabad, and Narnaul shows AI-enabled personalized learning platforms enhancing independence among children with PwID, while adaptive cognitive assessments piloted in Odisha and Bengaluru reduce diagnostic subjectivity. Educators at Vision Special School (Rohini) found speech-to-text and emotion detection boosted classroom participation, though requiring extensive training. Psychologists using multimodal AI screening achieved quicker identification of PwID, but rural clinics struggled with connectivity and device shortages. Urban families valued AI communication apps for fostering independence, whereas rural families worried about affordability and cultural fit. Adoption is stronger in urban schools and hospitals, with rural Anganwadis and clinics still at pilot stages. Addressing these divides requires culturally sensitive, localized AI solutions, government subsidies, and cross-sector collaboration to ensure equitable access.

In sum, the key transformative ways AI is reshaping disability care in India through diagnostic support: AI-based cognitive assessments piloted in Odisha and Bengaluru reduce subjectivity and clinician workload. Inclusive Education: Adaptive learning platforms and speech-to-text tools enhance participation in special schools (Delhi, Faridabad, Narnaul). Communication Tools: AI-driven augmentative communication apps (e.g., Shruti AI, Vaani AI) empower children with autism and speech impairments. Urban vs. Rural Divide: Urban schools and hospitals adopt advanced AI tools, while rural Anganwadis face affordability and connectivity barriers. Bridging these divides requires targeted government subsidies, culturally localized AI solutions, and sustained cross-sector collaboration to ensure equitable access.

7.5 The Origins

The antecedent words and concepts of AI trace back to mythology, philosophy, logic, and early computing—long before the term was formally coined at the Dartmouth Conference in 1956. Thinkers such as Alan Turing, Claude Shannon, and Warren McCulloch provided the intellectual

foundation, while myths of automatons and mechanical reasoning foreshadowed the idea of machine intelligence.

In the **Western tradition**, Greek mythology imagined self-moving beings like Hephaestus' golden handmaidens and Talos, the bronze giant. Philosophers such as Aristotle formalized syllogistic logic, and George Boole's algebra introduced symbolic computation. Alan Turing's *Universal Machine* (1936) and his seminal paper *Computing Machinery and Intelligence* (1950) reframed intelligence as imitation, while Claude Shannon's information theory (1948) quantified communication. McCulloch and Pitts (1943) modeled artificial neurons, Newell and Simon's *Logic Theorist* (1956) pioneered symbolic AI, and Arthur Samuel's checkers program introduced the term *machine learning*. Collectively, these antecedents—automaton, logic, algebra, machine, neuron, learning, and imitation—culminated in the naming of “artificial intelligence” in 1956.

In the **Indian intellectual tradition**, antecedents are equally rich. Bhartrhari's *Vākyapadīya* (5th century CE) explored language and cognition, while Gangesha Upadhyaya's *Navya-Nyāya* (13th century) advanced symbolic logic akin to Boolean systems. Patanjali's *Yoga Sūtras* (c. 2nd century BCE) provided systematic models of cognition, and the Jaina doctrine of *Syādvāda* anticipated multi-valued logic, foreshadowing fuzzy logic. Bhoja's *Samarangana Sūtradhara* (11th century) described mechanical devices and automata-like constructions, reflecting early explorations of technology. These traditions demonstrate how Indian thought intersects with computational models, enriching the cultural and philosophical dimensions of AI.

The application of AI in services for PwID has unfolded through **four transformative phases**. **Pre-AI & Early Digital Foundation (Pre-2000s)** Rudimentary computing and mechanical aids dominated this era. Rule-based cognitive software offered repetitive drills, while early Augmentative and Alternative Communication (AAC) devices provided speech-generating support. These tools laid the groundwork for digital accessibility.

Early Machine Learning & Specialized AI (2000–2015) Predictive algorithms and neural networks enabled adaptive systems. Intelligent Tutoring Systems tailored educational tasks, while computer vision models detected developmental delays. Mainstream devices like the iPad (2010) and Alexa (2014) democratized access to speech therapy and cognitive tools.

Deep Learning & Robotic Assistance (2015–2022) AI entered therapeutic environments. Social robots supported children with ASD, machine learning models analyzed health records for genetic causes of PwID, and personalized speech recognition engines improved comprehension of non-standard speech.

Generative AI & Cognitive Copilots (2023–Present) Large Language Models (LLMs) and multimodal generative AI now act as dynamic “cognitive scaffolds.” They generate personalized workflows, compress diagnostic timelines, and reduce caregiver burdens. Global regulations, such as the

EU's AI Act (2026), emphasize inclusivity and ethical safeguards (David, 2021; Baruah, 2017; Ferrante, 2013; Sharma, 2009; Upadhyaya, 1958).

7.6 Global and Indian trajectories of AI precursors in supporting PwID:

The earliest applications of AI's predecessors in supporting PwID emerged in the late 1970s–1980s through rule-based expert systems and computer-assisted instruction (CAI). These symbolic reasoning systems provided diagnostic decision support, repetitive drills, and logic exercises, marking the first structured attempt to formalize disability assessment. In the 1980s–1990s, CAI programs expanded into literacy, numeracy, and adaptive behavior training, offering repetitive reinforcement for children with intellectual disabilities. By the early 1990s, AAC devices introduced speech-generating tools, enabling non-verbal individuals to communicate. The 2000s ushered in Intelligent Tutoring Systems (ITS), which harnessed early machine learning to personalize educational tasks. In the 2010s, mobile apps and mainstream smart devices such as iPads and Alexa democratized access to assistive technology, making AI-driven engagement affordable and widely available. Finally, the 2020s brought deep learning, robotics, and generative AI, transforming disability services into inclusive, dynamic, and personalized systems that bridge diagnostics, therapy, and daily living.

In India, early digital foundations in special education during the 1990s–2000s relied heavily on imported CAI tools and AAC devices. Indigenous research began integrating symbolic logic traditions such as *Nyāya* and *Syādvāda* with computational models, offering culturally rooted perspectives on adaptive reasoning for PwID. By the 2010s, mobile-based AAC apps and machine learning-driven screening tools began appearing in Indian disability services. Yet challenges persisted: early systems were rigid and non-adaptive, accessibility was limited by cost and language barriers, ethical concerns arose around data use and bias in diagnostic expert systems, and the digital divide slowed adoption compared to Western contexts.

7.7 Common Misconceptions About AI and ID

AI is often assumed to be neutral, yet large language models frequently reproduce stereotypes, portraying PwID as dependent or “inspirational.” This framing undermines autonomy and ignores the reality that many PwID live independently and contribute meaningfully. A common misconception conflates ID with physical or sensory disabilities, erasing its distinct cognitive dimensions. AI also trivializes everyday actions by labeling them inspirational, reducing lived experiences to symbols rather than realities. Poorly designed systems risk reinforcing barriers instead of dismantling them.

In India, cultural narratives intensify these biases. Mythology often links disability to karma or divine punishment, fostering stigma and fatalism. Cinema historically amplified such tropes: early films framed

disability as tragedy, later decades emphasized pity, and the 2000s introduced the “super-crip” narrative, celebrating extraordinary talent while neglecting everyday barriers. Recent films like *Hichki* and *Margarita with a Straw* attempt authenticity but remain shaped by urban, middle-class perspectives. Policy frameworks such as the RPwD Act (2016) and Supreme Court guidelines (2024) promote visibility, yet enforcement and intersectional inclusion remain weak, often adopting paternalistic tones.

Against this backdrop, AI marks a decisive shift from mechanical aids to adaptive systems. Machine learning enables early detection of developmental delays, while natural language processing supports communication through speech-to-text and AAC tools. Computer vision powers assistive robotics, and brain–computer interfaces expand mobility. India's challenges—data scarcity, rural divides, and linguistic diversity—demand culturally sensitive innovation. Building on pioneers like Dr. Raj Reddy's work in speech recognition and Indian languages, future directions include federated learning, explainable AI, and multimodal systems. Success depends on embedding dignity, independence, and cultural responsiveness at the core of AI design.

7.8 Historical Trajectories

AI has deep historical roots shaped by divergent cultural traditions. In the West, antecedents trace back to ancient Greece, where Aristotle's logic laid the groundwork for computational reasoning. The 20th century marked a turning point with Alan Turing's work on computation and the Turing Test, reframing debates on machine intelligence. Western perceptions of PwID similarly evolved—from ancient stigmatization to Enlightenment-era moral treatment, culminating in 19th-century institutions for education and rehabilitation. In contrast, Indian thought drew upon the Vedas and Upanishads, which offered holistic insights into cognition and consciousness. The concept of *Buddhi* emphasized intellect within spiritual frameworks, yet PwID were often marginalized, interpreted through lenses of karma and reincarnation. These traditions together form an intellectual heritage that informs contemporary debates on AI and disability, urging inclusive approaches that respect diverse cognitive expressions.

Today, AI offers PwID significant benefits in communication, education, independence, and inclusion. Tools such as speech-to-text, real-time captioning, and adaptive learning platforms enhance accessibility, reduce caregiver burden, and foster autonomy. Healthcare applications improve documentation, data visibility, and personalized care planning. Social inclusion is strengthened through recommendation systems that connect PwID to communities, embodying the principle of “nothing about us without us.” In India, AI also catalyzes digital social capital (DSC), enabling PwID to participate in networks of trust and shared resources. Voice assistants in regional languages democratize access, while moderation systems curb online bullying. Employment opportunities expand through AI-driven job-matching and micro-entrepreneurship in AI-curated marketplaces. These advances resonate with

national initiatives such as Digital India and the Accessible India Campaign, alongside grassroots NGO efforts in counseling and telehealth.

Yet risks remain. Algorithmic bias can reinforce stereotypes, allocative harms may exclude PwID from education or jobs, and surveillance-based AI threatens privacy. Addressing these challenges requires bias audits, disability-inclusive datasets, and policy frameworks that prioritize equity, justice, and dignity. Thus, AI emerges not merely as a tool but as a catalyst for building meaningful DSC among PwID in India, weaving them into the fabric of digital society with dignity and agency.

AI contributions to PwID have evolved across distinct historical phases, reflecting both technological progress and human-centered concerns. During the **Establishment Period (1900–1972)**, structured educational interventions and communication aids like Braille, hearing aids, and communication boards laid the groundwork. The **Empowerment Period (1973–present)** saw digital assistive technologies, AAC devices, and adaptive learning systems gain prominence. In the **Early Digital Era (1970s–1990s)**, computer-based learning and early AAC supported repetition and speech generation. The **Machine Learning Era (2000–2015)** introduced intelligent tutoring systems, computer vision for developmental screening, and affordable smart devices like iPads and Alexa. The **Deep Learning & Robotics Era (2015–2022)** brought social robots for autism therapy, predictive AI for genetic diagnosis, and personalized speech recognition. Since 2023, generative AI and cognitive copilots have enabled step-by-step scaffolding, multimodal diagnostics, and automated documentation, while global regulations safeguard against bias. Between 2020–2025, inclusive education and diagnostic innovations dominated, alongside ethics and justice frameworks. By 2026–2027, scholarship matured into a balanced mix of education, robotics, ethics, healthcare, and systematic reviews, underscoring equity and quality of life as central priorities. Why the Establishment Period Matters? Although AI itself was not yet mature, **this was the first era when structured educational and communication tools were applied to PwID**. These interventions marked the beginning of systematic support beyond physical aids, laying the intellectual foundation for later AI-driven personalization.

Contributions to PwID began in the **Establishment Period (1900–1972)** with structured educational aids, but **true AI-driven impact emerged in the Empowerment Period (1973–present)**, transforming diagnosis, communication, and personalized learning. Would you like me to create a **visual flowchart** mapping these eras and their contributions for teaching purposes?

7.8 AI, Expert Systems & Robotics

Expert systems represent an early branch of AI, designed to replicate human expertise in specific domains through rule-based reasoning. They relied on static, human-coded knowledge to produce deterministic outcomes, making them transparent but limited in adaptability. In contrast, modern AI encompasses a wider spectrum of approaches, including

machine learning and deep learning, enabling systems to learn from data, adapt, and handle uncertainty. While expert systems excel in narrow, well-defined tasks like medical diagnosis, AI extends to diverse fields such as robotics, speech recognition, and predictive analytics, offering dynamic, probabilistic decision-making across multiple domains. Expert systems once dominated early AI in ID research, but recent Indian and global studies show a clear shift toward machine learning, adaptive assessment, AAC apps, and generative AI (Venkatesan, 2026).

Robotics, as an extension of AI, is increasingly recognized as a transformative tool in the care of PwID. Unlike purely digital AI applications, robots provide embodied, interactive systems that offer tangible social presence, thereby enhancing motivation, engagement, and independence. Social and educational robots such as *Nao* and *Pepper* have been deployed globally to foster communication, emotional recognition, and classroom participation among PwID. Research emphasizes co-design approaches, involving PwID and caregivers in robot development to ensure cultural relevance and usability. Smaller humanoid robots with multimodal communication—speech, gestures, lights, and music—are often preferred by users [Rai et al., 2023]. In India, pilot initiatives in Bengaluru and Hyderabad have explored robotic teaching aids in special schools, aligning with the National Education Policy (NEP) 2020 goals for inclusive education [Botre et al., 2025].

Rehabilitation robotics represents another frontier. Systematic reviews highlight robot-assisted interventions for cognitive disabilities, including autism and developmental disorders, where robots facilitate structured exercises in memory, sequencing, and social cognition [Jiang et al., 2021]. Exoskeletons and robotic prosthetics further support PwID with co-occurring motor impairments, enhancing mobility and independence. Beyond therapy, service robots assist with routine tasks such as reminders, navigation, and workplace support, while companion robots provide emotional support and reduce caregiver burden, particularly in urban families valuing independence.

Despite these advances, affordability and cultural adaptation remain pressing challenges. Robotics must complement, not replace, human caregivers, and adapt to Indian languages, gestures, and social norms. Future directions include integrating robotics into national disability policies, fostering collaboration between academia, industry, and government, and developing low-cost, locally manufactured robots for rural Anganwadis and special schools [Luckin et al., 2016].

AI and robotics together represent one of the most significant technological revolutions of our time. Robotics provides mechanical precision and repeatability, while AI adds perception, learning, and decision-making, enabling autonomous systems across industries. In India, particularly Bengaluru's thriving tech ecosystem, this integration is fueling innovation in automation, logistics, and assistive technologies for disability support.

AI acts as the “brain” of robotics. **Machine Learning (ML)** helps robots adapt and improve performance, whether navigating complex environments or predicting equipment failures. **Computer Vision** allows robots to interpret surroundings, powering self-driving cars, drones, and defect detection in factories. **Natural Language Processing (NLP)** enables intuitive communication, making service robots and healthcare assistants more effective. **Reinforcement Learning (RL)** supports trial-and-error learning, refining robotic movements in warehouses or surgical settings. **Generative AI** further simplifies programming, allowing robots to be instructed through natural language rather than complex code.

Applications span manufacturing, healthcare, logistics, agriculture, and domestic services. Yet challenges remain: ethical concerns about job displacement, technical limitations in unpredictable environments, safety issues, and regulatory gaps. In India, institutions like IISc and NIMHANS are advancing AI-driven rehabilitation, while government initiatives under *Digital India* and *Make in India* promote adoption. In essence, AI provides intelligence and adaptability, robotics offers embodiment, and together they are reshaping human life and industry.

AI Institutions in India

India has made significant strides in the field of AI with numerous institutions dedicated to research, development, and education. India has established a strong presence in artificial intelligence through leading institutions and research centers. The **IITs** (Bombay, Delhi, Madras) are pioneers in AI and machine learning, while the **Indian Institute of Science (IISc), Bangalore** excels in robotics and advanced AI studies. Several **NITs** and **IIITs** (Hyderabad, Bangalore) contribute specialized programs and applied research. The **Indian Statistical Institute (ISI)** integrates AI with data science, and the **Centre for Artificial Intelligence and Robotics (CAIR)** under DRDO develops defense applications. Industry bodies like **NASSCOM** promote AI education and collaboration. Additionally, universities such as **Hyderabad** and **Jawaharlal Nehru University** offer dedicated AI programs, complemented by private research hubs from **Google, Microsoft, and IBM**. The landscape of AI institutions in India is diverse, ranging from premier engineering institutes to specialized research centers. These institutions play a crucial role in advancing AI technology and fostering innovation in the country.

8. Progress & Prospects

The intersection of AI and ID in India is an emerging field, steadily advancing through research and planned initiatives. Current studies highlight AI's role in early diagnosis, education, communication, and behavioral support. Algorithms now analyze developmental milestones and behavioral patterns to aid screening (Gupta & Kumar, 2021). In classrooms, personalized learning platforms adapt content to individual needs, enhancing engagement and skill acquisition (Sharma & Singh, 2020). Communication support has expanded through AI-powered speech and language applications, improving social interaction for individuals with limited verbal skills (Rao & Nair, 2022).

Behavioral analysis systems further assist caregivers by identifying triggers and designing interventions for challenging behaviors (Kumar & Joshi, 2021). Collectively, these advances underscore AI's growing role in inclusive care and education.

Looking ahead, India envisions deeper integration of AI into therapeutic practices, with collaborations between technologists and clinicians to design intervention tools. Family support networks are a priority, as NGOs and institutions plan AI-driven platforms offering resources and guidance. Large-scale data collection, in partnership with schools and healthcare providers, will evaluate outcomes and refine interventions. Policy development is also underway, with NASSCOM and the Ministry of Social Justice advocating ethical frameworks to guide AI use for PwID.

Yet challenges remain. Biased datasets risk reinforcing stereotypes, hiring systems may exclude candidates, and surveillance tools threaten autonomy. Privacy breaches and poorly designed assistive technologies can overwhelm users, compounded by India's digital divide. To balance promise and vulnerability, inclusive design must involve PwID in development, bias audits should monitor discriminatory patterns, and policies must enforce responsible standards. Training educators, employers, and caregivers will ensure AI empowers rather than marginalizes, creating pathways toward genuine inclusion.

9. Future Directions

AI in ID care in India is entering a transformative phase, expanding tools for diagnosis, communication, and education across diverse settings. Machine learning and predictive analytics enable early detection of developmental delays, while natural language processing supports AAC through speech-to-text and gesture recognition. Adaptive learning platforms and gamified interventions personalize education, fostering independence and social participation. Tailoring solutions to linguistic diversity and cultural contexts ensures accessibility and relevance.

Recent scholarship illustrates this dynamic landscape. Mulfari et al. (2019) developed machine learning solutions for dysarthria, enhancing speech intelligibility. Andzik and Chung (2022) emphasized individualized AAC interventions, while Praveena et al. (2020) highlighted emotion recognition and affective computing. Ke, Moon, and Sokolikj (2022) demonstrated the promise of VR in social skills training for autism, and Sailer and Homner (2020) synthesized evidence on gamification's motivational impact. Bian and Modave (2020) situated assistive technologies within broader healthcare transformations, underscoring AI's systemic role.

Planned initiatives in India envision embedding AI into therapeutic practices, building family support networks, and expanding large-scale data collection through schools and healthcare providers. Policy development, led by NASSCOM and the Ministry of Social Justice, seeks ethical frameworks to guide responsible AI use.

Yet challenges remain: biased datasets risk reinforcing stereotypes, surveillance tools threaten autonomy, and privacy breaches erode trust. High costs, infrastructural gaps, and limited professional training hinder equitable adoption. To balance promise and vulnerability, inclusive design must involve PwID directly, bias audits should monitor discriminatory patterns, and educators, employers, and caregivers require training. With ethical safeguards and cultural responsiveness, AI can evolve into a powerful enabler of dignity, independence, and genuine inclusion.

10. Conclusion

For PwID, AI is a double-edged sword: it can empower through assistive technologies but also marginalize if biases and privacy risks go unchecked. The safest path forward is **co-design with disability communities, transparent regulation, and continuous bias monitoring** to ensure AI becomes a tool of inclusion rather than exclusion.

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References

- [1] Alanazi, A. S., Alqazlan, S., Alanazi, R., & Benlaria, H. (2026). Explainable AI for early developmental disability detection: a neuro-fuzzy approach. *Frontiers in Public Health*, 14, 1691449.
- [2] Alanazi, R. A., Alanazi, A. S., & Benlaria, H. (2025). Interpretable Machine Learning for Developmental Disability Diagnosis: An Adaptive Neuro-fuzzy. *Journal of Disability Research*, 4(6), 20250741.
- [3] Alatawi, M. (2024). Empowering minds: Exploring the impact of AI in facilitating inclusive education for students with intellectual disabilities. *Journal of Arts, Literature, Humanities and Social Sciences*, (106), 358-380.
- [4] Almufareh, M. F., Tehsin, S., Humayun, M., & Kausar, S. (2023). Intellectual disability and technology: an artificial intelligence perspective and framework. *Journal of Disability Research*, 2(4), 58-70.
- [5] Alnahdi, G. H. (2020). *Assistive technology in special education: Resources for inclusive classrooms*. Arlington, Oxfordshire, UK: Routledge.
- [6] Al-Naim, N. A. A. (2026). The impact of artificial intelligence on the quality of life for individuals with intellectual disabilities in Saudi Arabia: A PRISMA-compliant systematic review and meta-analysis. *Acta Psychologica*, 263, 106348.
- [7] Alsaleh, A. (2026). The influence of artificial intelligence on individuals with disabilities. *Acta Psychologica*, 262, 106010.
- [8] Alsolami, A. S. (2025). The effectiveness of using artificial intelligence in improving academic skills of school-aged students with mild intellectual disabilities in Saudi Arabia. *Research in Developmental Disabilities*, 156, 104884.
- [9] Arkin, R. C. (1998). *Behavior-based robotics*. Cambridge, MA: MIT Press.
- [10] Aydoğan, A., & Kaptanlar, Y. S. (2025, April). Artificial intelligence supported solutions in education: Disabilities new possibilities for individuals. In *International Conference on Information and Communication Technology for Intelligent Systems* (pp. 455-465). Singapore: Springer Nature Singapore.
- [11] Baldo, F., Piovesan, A., Rakvin, M., Ramacieri, G., Locatelli, C., Lanfranchi, S., ... & Pelleri, M. C. (2023). Machine learning based analysis for intellectual disability in Down syndrome. *Heliyon*, 9(9).
- [12] Bennett, G., & Goodall, E. (Eds.). (2026). *The Palgrave Encyclopedia of Disability*. Cham: Springer Nature Switzerland AG.
- [13] Bian, J., & Modave, F. (2020). The rapid growth of intelligent systems in health and health care. *Health Informatics Journal*, 26(1), 5-7.
- [14] Carruba, M. C., Caiazzo, A., & Sapone, C. (2025). A UDL-based approach to ai chatbot interaction for young adults with intellectual disabilities. *Italian Journal of Health Education, Sport and Inclusive Didactics*, 9(1).
- [15] Chaudhary, M., Kumar, D., Chaudhary, R. K., & Kumar, K. (2026). Personalized learning through artificial intelligence for students with intellectual disabilities: A systematic review. *International Journal of Future Multidisciplinary Research*, 3(3), 1-15.
- [16] Chen, S., Peng, D., Barbareschi, G., Chen, D., & Sato, C. (2025, April). A Reflective Journey for Individuals with Intellectual Disabilities: Rediscovering Competency Through AI-Enhanced Iron Beads Crafting. In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems* (pp. 1-18).
- [17] Correll, N., Hayes, B., et al. (2022). *Introduction to autonomous robots*. Boca Raton, FL: CRC Press.
- [18] Craig, J. J. (2017). *Introduction to robotics: Mechanics and control* (4th ed.). London, UK: Pearson.
- [19] de Vries, S., van Oost, F., Smaling, H., de Knecht, N., Cluitmans, P., Smits, R., & Meinders, E. (2024). Real-time stress detection based on artificial intelligence for people with an intellectual disability. *Assistive Technology*, 36(3): 332-340.
- [20] Drigas, A. S., & Ioannidou, R. E. (2011). A review on artificial intelligence in special education. *World Summit on Knowledge Society*, 385-391.
- [21] El Morr, C., El-Lahib, Y., & Gorm, R. S. (2025). *Beyond tech fixes: Towards an OAI future where disability justice thrives*. Heidelberg, Germany: Springer.
- [22] El Sarraj, W., Holt, R., & Bradley, P. (2026). Exploring staff perspectives about AI technology in a specialist intellectual disability service. *Advances in Mental Health and Intellectual Disabilities*, 1-10.
- [23] Elkhaila, M. B. M. (2026). Enhancing cognitive skills in students with moderate intellectual disabilities: Effectiveness of an immersive adaptive ai educational system integrating natural language processing and multi-sensory interaction. *Open Access Library Journal*, 13, e15289.

- [24] Elkot, M. A., Youssif, E., Elmahdi, O. E. H., Abd Algane, M., & Ali, R. (2025). Generative conversational AI: Active practices for fostering students with mild intellectual disabilities to improve English communication skills. *Contemporary Educational Technology*, 17(1).
- [25] Faiz, M. A. (2024). The benefits of AI mobile applications in improving learning for children with intellectual disabilities: A pilot study perspectives from special education teachers. *Al-Mahdi Research Journal (MRJ)*. 3(1): 45-56.
- [26] Faiz, M. A., & Fazil, D. H. (2025). Improving memory in boys with mild intellectual disability through AI-based mobile apps: A single-subject study. *TPM–Testing, Psychometrics, Methodology in Applied Psychology*, 32(S5): 1787-1799.
- [27] Fan, J., Zeng, J., & Li, H. (2026). Effects of conversational AI-enhanced peer-mediated intervention by peers with intellectual disabilities on conversational skills in children with ASD. *Research in Developmental Disabilities*, 170, 105249.
- [28] Fortuna, Y. G. (2022). Diagnostic Expert System for Children with Mental Disabilities with the Certainty Factor Method. *Journal of Computer Scine and Information Technology*, 92-97.
- [29] Garg, S., & Sharma, S. (2020). Impact of artificial intelligence in special need education to promote inclusive pedagogy. *International Journal of Information and Education Technology*, 10(7): 523--527.
- [30] Ghafghazi, S., Carnett, A., Neely, L., Das, A., & Rad, P. (2021). AI-augmented behavior analysis for children with developmental disabilities: Building toward precision treatment. *IEEE Systems, Man, and Cybernetics Magazine*, 7(4), 4-12.
- [31] Giaouri, S. (2026). Teaching reading and literacy using artificial intelligence to students with intellectual disability. In D. V. Katsarou & I. Dosi (Eds.), *Optimizing bilingual development in typical and atypical children: Language acquisition, use, and interventions* (pp. 317–336). Hershey, PA: IGI Global Scientific Publishing.
- [32] Gongor, F., & Tutsoy, O. (2024). Survey on recent artificial intelligence-based assistive robotics technologies for children with special needs. *Robotics Review*, 8(1), 1-12.
- [33] Govers, F. X. (2018). *Artificial intelligence for robotics*. Birmingham, UK: Packt.
- [34] Gupta, C., Chandrashekar, P., Jin, T., He, C., Khullar, S., Chang, Q., & Wang, D. (2022). Bringing machine learning to research on intellectual and developmental disabilities: Taking inspiration from neurological diseases. *Journal of Neurodevelopmental Disorders*, 14(28).
- [35] Gupta, C., Chandrashekar, P., Jin, T., He, C., Khullar, S., Chang, Q., & Wang, D. (2022). Bringing machine learning to research on intellectual and developmental disabilities: taking inspiration from neurological diseases. *Journal of neurodevelopmental disorders*, 14(1), 28.
- [36] Hamideh Kerdar, S., Kirchhoff, B. M., Bächler, L., & Adolph, L. (2022). Technological interventions for vocational inclusion of individuals with disabilities: A scoping review protocol. *Disabilities*, 2(3), 529–539.
- [37] Hong, H., & Kim, Y. (2024). Applying artificial intelligence in career education for students with intellectual disabilities: The effects on career self-efficacy and learning flow. *Education and Information Technologies*, 29(18), 25237-25256.
- [38] Islam, M., Wahid, A., & Kumar, P. (2023). December). Understanding Intellectual Disability and Genetics with AI Perspective: A Text Mining Approach. In *2023 IEEE International Conference on Machine Learning and Applied Network Technologies (ICMLANT)* (pp. 1-6). IEEE.
- [39] Jiang, J., Li, X., Chen, Y., Wang, H., and Zhao, L. (2021). *Ethical challenges of AI in education and disability care: Privacy, bias, and socioemotional impacts*. *Journal of Educational Technology Research and Development*, 69(4), 1123–1145.
- [40] Jones, M. (1984). Expert systems: Their potential roles within special education. *Peabody Journal of Education*, 62(1), 52-66.
- [41] Karuppasamy, M., & Sujathamalini, J. (2025). Challenges in the adoption of AI for equity and accessibility for children with intellectual disabilities. In *Conference monograph titled Technology Integration in Special Education: Tools, Trends and Transformations* Madurai, Tamil Nadu: Shanlax Publications
- [42] Ke, F., & Moon, J. (2022). Virtual reality-based social skills training for children with autism spectrum disorder. *Journal of Special Education Technology*, 37(1), 49–62.
- [43] Kharbat, F. F., Alshawabkeh, A., & Woolsey, M. L. (2021). Identifying gaps in using artificial intelligence to support students with intellectual disabilities from education and health perspectives. *Aslib Journal of Information Management*, 73(1), 101-128.
- [44] Khosrow-Pour, M. (2021). *Encyclopedia of Information Science and Technology*, 5th Edition (3 volumes), Hershey Pennsylvania: IGI Global.
- [45] Kumar, A, Natyyar, A., & Jain, R. AI Assisted special education in India. Hershey, PA: IGI Global.
- [46] Kumar, A., & Singh, R. (2022). Artificial intelligence for disability inclusion: Opportunities and challenges in India. *Disability Inclusion & AI*, 32(2): 82-104.
- [47] Kumar, V., & Joshi, M. (2021). Behavioral analytics in children with intellectual disabilities using AI. *Journal of Indian Academy of Applied Psychology*.47(1): 55-66.
- [48] Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Artificial intelligence in education: Promises and implications for teaching and learning*. London, UK: Pearson.
- [49] Lynch, K. M., & Park, F. C. (2017). *Modern robotics: Mechanics, planning, and control*. Cambridge, UK: Cambridge University Press.
- [50] Malviya, R., & Rajput, S. (2025). The history of AI in transforming disability support. In *Advances and insights into AI-created disability supports* (pp. 25–48). Singapore: Springer Nature.
- [51] Malviya, R., & Rajput, S. (2025). *Advances and insights into AI-created disability supports*. Springer Nature.

- [52] Mason, M. T. (2001). *Mechanics of robotic manipulation*. Cambridge, MA: MIT Press.
- [53] Minhaj, Muneeza, Khan, A., Khishe, M., Gumaiei, A. H., Alzanin, S. M., ... & Ashraf, S. (2025). An intelligent decision support system for selecting optimal AI-powered assistive technology for individuals with disabilities. *International Journal of Computational Intelligence Systems*, 18(1), 78.
- [54] Mujkanović, E. (2025). The application of artificial intelligence and assistive technology in supporting children with developmental disabilities. *Multidisciplinary Pristupi u Edukaciji i Rehabilitaciji*, 7(10), 95-104.
- [55] Murphy, R. (2019). *Introduction to AI robotics* (2nd ed.). Cambridge, MA: MIT Press.
- [56] Nacheva, R., & Czaplewski, M. (2024). Artificial intelligence in helping people with disabilities: Opportunities and challenges. *HR and Technologies*, 1, 102-124.
- [57] Nanda, A., Nanda, M., Padhy, B. B., Padhy, A. K., Das, P. K., & Mahapatra, A. P. K. (2026). Applications of Artificial Intelligence in Intellectual Disability: Opportunities and Challenges in the Indian Context. *Journal of Education, Society and Behavioural Science*, 39(2), 121-136.
- [58] Nantaburom, S., & Wetcho, S. (2026). The role of artificial intelligence in special and inclusive education: A systematic literature review. *Contemporary Educational Technology*, 18(2), 652.
- [59] Noor, A., Almukhalafi, H., Atlam, E. S., & Noor, T. H. (2025). Supporting disabilities using AI and the Internet of Things: Research issues and future Directions. *Disabilities*, 6(1), 3.
- [60] Olawade, D. B., Bolarinwa, O. A., Adebisi, Y. A., & Shongwe, S. (2025). The role of AI in enhancing healthcare for people with disabilities. *Social Science & Medicine*, 364, 117560.
- [61] Othman, A. (Ed.). (2027). *Research on the intersection of disability, technology, and education*. New York: Springer.
- [62] Pita, C. P. C., & Ordoñez-Avila, R. (2026). Artificial intelligence technologies focused on the care and development of people with disabilities. *Revista Científica de Informática ENCRYPTAR-ISSN: 2737-6389*, 9(17), 87-108.
- [63] Prakash, P., Whittington, P., & Dogan, H. (2025). *AIoT driven smart mobility systems: A systematic literature review and inclusive strategic research framework—a case study of Indian context. Proceedings of the Indian National Science Academy*. New York: Springer.
- [64] Rai, H. L., Saluja, N., & Pimplapure, A. (2023). *Advancing support for children with special needs through artificial intelligence: Effects, social implications, and challenges*. Damoh, MP: Eklavya University Research Publications.
- [65] Rao, S., & Nair, P. (2022). Assistive Technologies for Enhancing Communication in Intellectual Disabilities. *International Journal of Disability, Development and Education*, 69(6), 1810–1825.
- [66] Seale, J. (2022). *Digital technology and inclusion: International perspectives on learners with intellectual disabilities*. Oxfordshire, UK: Routledge.
- [67] Shankar, R., & Bhat, A. (2022). *Artificial intelligence and disability inclusion: Opportunities, challenges, and policy perspectives in India. International Journal of Disability Studies*, 4(2), 45–60.
- [68] Sheehan, R., & Hassiotis, A. (2017). Digital mental health and intellectual disabilities: state of the evidence and future directions. *Evidence Based Mental Health*, 20(4), 107-111.
- [69] Siciliano, B., & Khatib, O. (Eds.). (2016). *Springer handbook of robotics*. New York: Springer.
- [70] Song, C., Jiang, Z., Hu, L., Li, W., Liu, X., Wang, Y., Jin, W., & Zhu, Z. (2022). A machine learning-based diagnostic model for children with autism spectrum disorders complicated with intellectual disability. *Frontiers in Psychiatry*, 13, 993077.
- [71] Special Olympics. (2026). *Is AI fair? New evidence suggests bias against people with intellectual disabilities is built in. Disability and Health Journal*, 19(4), 102086.
- [72] Susetyo, B., & Tarsidi, I. (2026). AI as a Learning Assistant: Child with Intellectual Disability Distinguish the Letters B and D. *Mimbar Ilmu*, 31(1), 149-158.
- [73] Thrun, S., Burgard, W., & Fox, D. (2005). *Probabilistic Robotics*. Cambridge, MA: MIT Press.
- [74] Todoranova, L. (2023). Artificial intelligence in support of individual assessment of support needs for people with disabilities. *Известия на Съюза на учените-Варна. Серия Икономически науки*, 12(1), 159-166.
- [75] Tsvetkova, P., Sousa, C., Beiderbeck, D., Kochanowicz, A. M., Gerazov, B., Agius, M., ... & Tkaczyk, A. H. (2024). International perspectives on assistive technologies for autism and intellectual disabilities: Findings from a Delphi study. *Disabilities*, 4(4), 1138-1155.
- [76] Venkatesan, S. (2009). *Ethical guidelines for bio-behavioral research*.
- [77] Mysore: All India Institute of Speech and Hearing.
- [78] Venkatesan, S. (2026). Digital social capital and intellectual disability in india: An analytical review of measures, evidence, and research trends. *International Journal of Science and Research (IJSR)*, 15(9), 532-542.
- [79] Vashisht, P., & Jatain, A. (2023). A novel approach for diagnosing neuro-developmental disorders using artificial intelligence. *Inteligencia Artificial*, 26(71), 13-24.
- [80] Wang, L., Kameswaran, V., & Kacorri, H. (2025). *Toward a taxonomy of algorithmic harms for disability: A systematic review. Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society*, 8(3), 2649–2665.
- [81] Xue, Y. (2026). *Leveraging ai chatbots to empower students with intellectual and developmental disabilities for workforce success* (Doctoral dissertation, Washington State University).
- [82] Yadav, G. K. (2023). *Improving the Quality of Life for Intellectually Disabled Elderly People using Artificial Intelligence Techniques*.