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The Use Of Artificial Intelligence (AI) As An Interactive Learning Tool For Students With Intellectual Disabilities In Special Education Schools

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Keywords:
Artificial Intelligence; Interactive Learning Media; Intellectual Disabilities; Special Education.

Abstract

Artificial intelligence (AI) offers opportunities to develop adaptive and interactive learning media for students with intellectual disabilities, whose learning needs often require concrete explanations, repetition, and individualized support. This study examines the potential, applications, and implementation challenges of AI-assisted learning media in special education. A qualitative literature review was conducted using a PRISMA-guided identification and screening process. Of 72 publications collected, 11 articles published between 2020 and 2026 were selected for critical analysis and synthesis. The reviewed studies addressed AI-based applications, multimodal instructional media, adaptive learning, and assistive technologies. Findings suggest that these technologies can support students' attention, engagement, motivation, conceptual understanding, memory, and independence by providing visual representations, structured practice, and immediate feedback. However, evidence varies considerably across study designs, learner characteristics, and technologies. Several studies relied on teachers' perceptions or small samples rather than direct classroom measurements, limiting conclusions about effectiveness. Implementation challenges include inadequate devices and internet connectivity, insufficient teacher training, accessibility barriers, and concerns about privacy and data ethics. The synthesis indicates that AI should complement, rather than replace, teachers' pedagogical judgment and individualized instruction. This study contributes a needs-oriented perspective for designing accessible, adaptive, and pedagogically relevant AI-assisted media for students with intellectual disabilities. Further classroom-based research is necessary to evaluate learning outcomes and long-term applicability.

Kata kunci:
Kecerdasan Buatan; Media Pembelajaran Interaktif; Tunagrahita; Pendidikan Khusus.

Abstrak

Kecerdasan buatan (Artificial Intelligence/AI) menawarkan peluang pengembangan media pembelajaran adaptif dan interaktif bagi siswa tunagrahita yang membutuhkan penjelasan konkret, pengulangan, dan pendampingan individual. Penelitian ini bertujuan menganalisis potensi, bentuk pemanfaatan, serta tantangan penerapan media pembelajaran berbantuan AI dalam pendidikan khusus. Penelitian menggunakan pendekatan kualitatif melalui kajian literatur dengan proses identifikasi dan seleksi artikel yang mengacu pada alur PRISMA. Dari 72 publikasi yang terkumpul, sebanyak 11 artikel terbitan tahun 2020–2026 dipilih untuk dianalisis dan disintesis secara kritis. Kajian mencakup aplikasi berbasis AI, media pembelajaran multimodal, pembelajaran adaptif, dan teknologi asistif. Hasil sintesis menunjukkan bahwa teknologi tersebut berpotensi mendukung perhatian, keterlibatan, motivasi, pemahaman konsep, daya ingat, dan kemandirian siswa melalui visualisasi, latihan terstruktur, serta umpan balik langsung. Namun, kekuatan bukti berbeda menurut desain penelitian, karakteristik peserta didik, dan jenis teknologi. Sejumlah penelitian masih mengandalkan persepsi guru atau sampel terbatas sehingga efektivitasnya belum dapat digeneralisasikan. Tantangan penerapan meliputi keterbatasan perangkat dan jaringan internet, kurangnya pelatihan guru, hambatan aksesibilitas, serta persoalan privasi dan etika data. Temuan

menegaskan bahwa AI sebaiknya menjadi pendukung, bukan pengganti, peran pedagogis guru dan pembelajaran individual. Penelitian ini memberikan dasar konseptual bagi pengembangan media berbantuan AI yang aksesibel, adaptif, dan sesuai kebutuhan siswa tunagrahita. Penelitian kelas lebih lanjut diperlukan untuk menguji hasil belajar dan keberlanjutan penerapannya.

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Introduction

Every citizen has the fundamental right to a proper education, including children with special needs (ABK). Equality is the fundamental principle that serves as the foundation for not discriminating against any citizen based on economic or social background, gender, ethnicity, religion, or disability status. Quality education is a right for all citizens. This is guaranteed by the national constitution as the primary foundation, as stated in Article 31, Paragraph (1) of the 1945 Constitution and reinforced by Law No. 20 of 2003, Articles 32, Paragraphs (1) and (2). Furthermore, Law No. 8 of 2016, Articles 10, 40, and 42, explicitly guarantee the right to education for people with disabilities. Delivering quality education requires educators capable of adapting to technological advancements. In the modern era, the use of technology is not merely supplementary but has become an integral part of human life. In the field of education, technology serves as a medium capable of transforming the very foundations of teaching and learning into more innovative practices. Advances in technological innovation can contribute to improving the quality of learning at all levels from students and educators to educational institutions (Dewi, 2024).

Over the past two decades, the integration of technology into the world of education has seen significant development. The presence of technology today cannot be underestimated, as it serves as the primary foundation for ensuring the effectiveness, convenience, and quality of the learning process. The utilization of Artificial Intelligence (AI)-based technology has advanced at a rapid pace. AI plays a role in educational innovation by analyzing learning data, adapting instructional materials, and providing immediate, personalized feedback to each student who uses it. The use of AI in education has expanded, ranging from adaptive and interactive learning systems. The implementation of AI in education has broadened to include interactive and adaptive learning systems, intelligent tutoring systems, learning analytics, and automated assessment (Luckin et al., 2016; Zawacki-Richter et al., 2019). Advances in AI-based technology open opportunities to design flexible learning

experiences that are easily accessible and tailored to students' learning needs. The opportunities and challenges of utilizing AI for students in special education settings should not be viewed solely from the perspective of feature sophistication but must also consider pedagogical relevance and students' learning needs (Voultsiou & Moussiades, 2025).

Another perspective is expressed by Lynch et al., (2024), who state that the use of AI-assisted technology for students with disabilities in low- and middle-income countries requires further, robust, and long-term research that considers student engagement, pedagogy, and curriculum design to understand its impact on improving the educational experiences of children with disabilities. In technology development, clarity regarding accessibility, individual support, and user involvement is essential to ensure that the resulting innovations are more adaptive and functional (Piekema et al., 2024). A study by Chalkiadakis et al., (2024), highlights the importance of integrating AI and VR as part of a broader strategy to create a truly inclusive learning environment aligned with the goals of the Convention on the Rights of Persons with Disabilities.

Several previous studies have shown that interactive learning media can enhance student engagement, conceptual understanding, and learning motivation among students with special needs. Armini & Purwanta, (2025), suggest that interactive animation media can be an effective tool for developing reading skills in children with intellectual disabilities. International studies show that AI can make a significant contribution to improving learning effectiveness through instructional materials tailored to students abilities and learning styles (Chen et al., 2020; Khosravi et al., 2022). To create adaptive learning environments, AI can recognize patterns in student responses, track learning difficulties, and automatically reinforce content (Syah et al., 2025). This is particularly relevant for students with special needs who require individualized, repetitive, and needs-based approaches. When designing adaptive and flexible learning experiences to support Universal Design for Learning (UDL), teachers can utilize generative AI to design instructional materials (Evmenova et al., 2024).

In the field of special education, the use of AI is beginning to receive serious attention. A systematic review by Hussein et al., (2025) shows that AI significantly improves students' academic performance, communication skills, emotional regulation, and physical mobility by providing tailored interventions to meet individual needs. Similarly, research by Faiz & Fazil, (2024) shows that AI-based educational applications significantly improve attention span, motivation, and learning outcomes by providing interactive and personalized educational content for students with intellectual disabilities. Thus, adaptive digital technology can help students with intellectual disabilities understand concrete concepts through visualizations and interactive simulations.

Students with intellectual disabilities, known in the international literature as students with intellectual disabilities, are characterized primarily by limitations in intellectual functioning and adaptive behavior that affect their academic,

communication, and social skills (Schalock et al., 2021). In general, they experience difficulties with abstract thinking, processing complex information, maintaining focus for extended periods, and applying concepts to different situations. Therefore, for students with intellectual disabilities, effective learning is concrete, directly observable, context-appropriate, repetitive, and provides immediate feedback (Kelly R. & Westling, 2019).

A study conducted by Torra Moreno et al., (2021) revealed the potential and benefits of digital interventions on students' cognitive, academic, social, and behavioral aspects. Similarly, Stančin et al., (2020) stated that digital game-based learning can support the cognitive development and specific skills of students with intellectual disabilities. The use of assistive technology can support accessibility for students with disabilities, making it easier for them to access learning (Fernández-Batanero et al., 2022).

Although interactive learning media have been widely developed, research specifically exploring learning media integrated with AI for students with intellectual disabilities tailored directly to their cognitive needs—remains scarce. A literature review indicates that adaptive learning, automated assessment, and feedback can be specifically implemented using AI; however, their application in the context of special education remains limited (Hussein et al., 2025). AI-based interventions have been shown to improve learning outcomes for students with disabilities, as AI has the potential to enhance accessibility and individualized learning. However, due to the diverse characteristics of students with special needs, existing findings cannot be generalized to students with intellectual disabilities in special schools (Nantaburom & Wetcho, 2026; Zhang et al., 2026).

Research focused on developing AI-assisted learning media designed for students with intellectual disabilities in special schools in Indonesia remains limited or rarely conducted. In the field of education, studies on the use of AI have largely focused on general education or large-scale online learning, rather than on the characteristics of students with intellectual disabilities using adaptive media designs. Therefore, research is needed in the form of a specific literature synthesis that discusses and examines the relevance of utilizing AI as interactive learning media for students with intellectual disabilities in special education schools. This study uses individual learning needs and thinking ability characteristics as the foundation for analysis. Thus, it is hoped that this study will produce conceptual guidelines for the use of AI-assisted learning media so that they are better suited to the learning needs of students with intellectual disabilities.

Method

The method used in this study is qualitative research. In qualitative research, the researcher focuses on detailed, comprehensive, and in-depth descriptive notes that provide a picture of the actual conditions (Nugrahani, 2014). The approach taken in this study is a literature review. A literature review is a series of activities related to collecting data from various sources, reading and taking notes, and managing the findings objectively, in a structured, analytical, and critical manner (Sukmadinata, 2013;

Zed, 2003).

The analytical technique used in this study is *a literature review.* A literature review is a form of evaluation and critical analysis of research, theories, or publications related to a specific topic (Kraus et al., 2022). Data analysis is conducted by compiling or collecting the results of previous studies based on criteria determined by the researcher. Subsequently, the compiled research findings were evaluated and synthesized to strengthen the theoretical foundation of the study, identify gaps in previous research, and provide guidance for researchers in developing a conceptual framework for their studies. The steps taken in this study were: (1) selecting the topic to be reviewed; (2) selecting articles relevant to the topic, (3) analyzing and synthesizing the selected articles, and (4) organizing the writing of the review.

The data collection technique in this study followed the PRISMA diagram, using several criteria for sampling journals or articles. These criteria were:

1. articles published in journals indexed in Scopus, Google Scholar, and ScienceDirect;
2. articles published between 2020 and 2026
3. articles discussing Artificial Intelligence (AI) in the context of learning or education
4. articles related to students with intellectual disabilities, special education, or children with special needs
5. Articles that discuss the use of AI, educational technology, digital media, or interactive learning media;
6. Keywords for article searches include Artificial Intelligence, interactive learning media, students with intellectual disabilities, special education, educational technology, assistive technology, and digital learning.

The sequence of data analysis begins with identification through a search of journal databases using predetermined keywords. Next, a screening process is conducted to eliminate irrelevant journals. Then, suitable or eligible journals are selected from the screening results. The eligible journals are subsequently included in the literature review analysis.

Based on the criteria above, the researcher compiled previous research findings and identified 11 articles suitable for inclusion *in the literature review* out of the 72 articles collected.

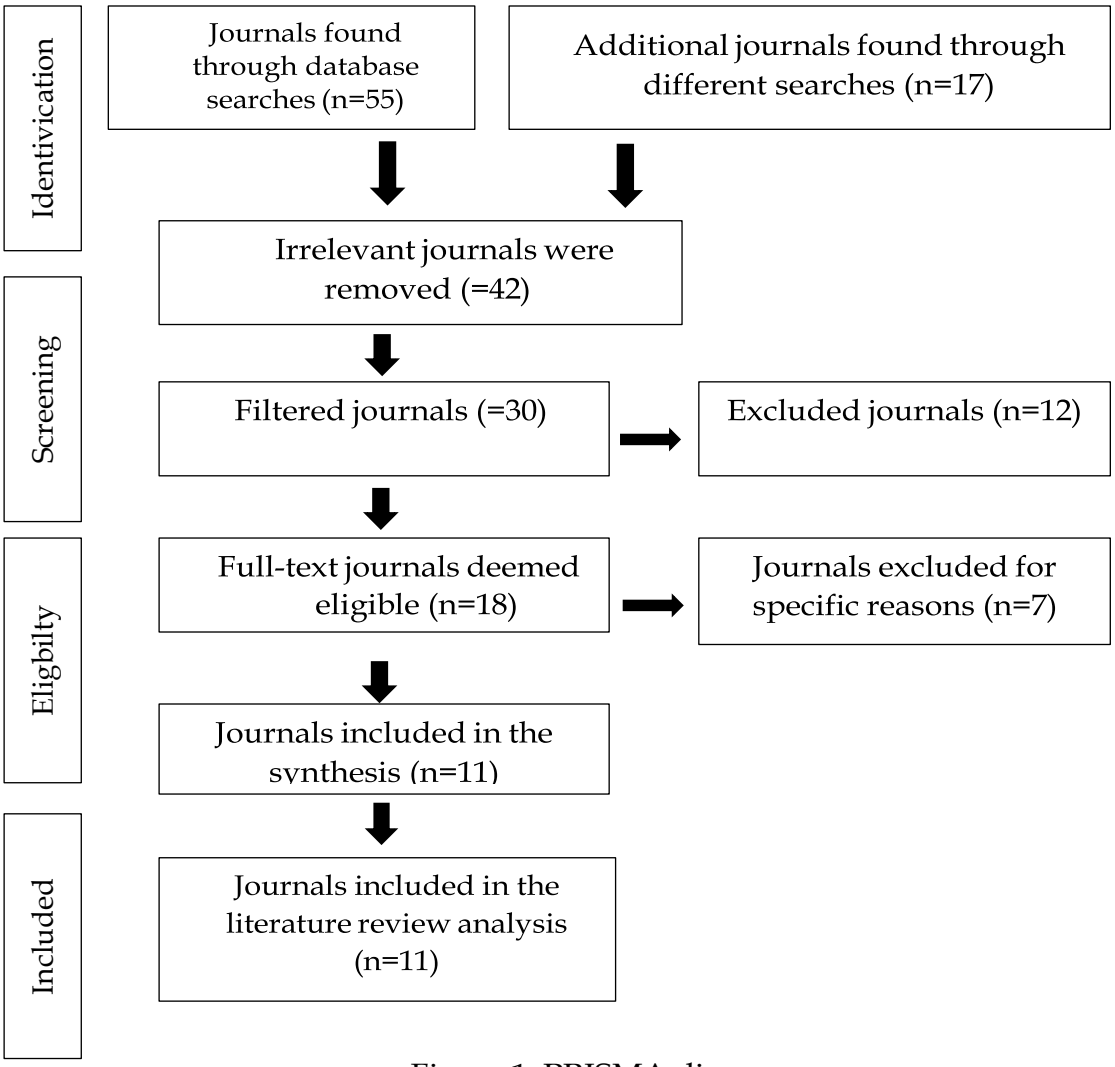


Figure 1. PRISMA diagram

Results And Discussion

Results

Based on the screening and selection process, we identified 11 relevant articles suitable for analysis. The analysis revealed that the use of AI has the potential to benefit students with intellectual disabilities. Several studies indicate that the use of AI for students with intellectual disabilities remains limited to teachers' perceptions based on academic reviews and professional rank and has not yet been implemented in real-world classroom contexts. The use of AI as a learning tool for students with disabilities can take the form of interactive and audiovisual media tailored to students' characteristics, providing immediate feedback. Thus, the use of AI can enhance conceptual understanding of subject matter, boost learning motivation, improve memory retention, and help students regulate their social-emotional responses.

The research results include data obtained from the analysis of studies selected as relevant samples. The analysis revealed a total of 11 studies, classified as follows:

Table 1

Previous Research

Author	Title	Method	Results	Findings
Nursanti et al., (2026)	Utilization of *the* "Smart hands" *Deep Learning* Model to Improve the Independenc e of Students with Intellectual Disabilities	Qualitative descriptive study using a naturalistic phenomen ological research design	The Smart Hands deep learning model has had a significant impact on access and independence including physical independence, academic independence, social and emotional independence, and the promotion of independence at home.	The research findings revealed that students were able to develop understanding after using the learning media, were able to maintain motivation and consistency in their behavior on their own. However, implementation in the field still faces challenges in the form of limited devices, an and varying in digital literacy digital.
Siagian et al., (2026)	Analysis of the Responses of Students with Intellectual Disabilities to Tactile Letters and Artificial Intelligence Based Animated Videos in the Teaching of Vowels	Qualitative descriptive with a case study design	Positive were demonstrated by all subjects toward AI-based animated media. The multimodal stimuli that designed the researchers proved to be effective in increasing attention, reducing distraction, and enhancing engagement in in activities. On the other hand hand, there have been varying responses to the media arise in	The findings of this study indicate that students with intellectual disabilities possess unique and individual characteristics. Teachers need to integrate media that to accommodate that The use of AI can be used to integrate concre te and audiovisual learning in a digital format.

Author	Title	Method	Results	Findings
			the classroom IV and V grade. Students in IV were very positive and enthusiastic about the raised-letter media, enabling them to maintain their focus for longer. Meanwhile, fifth-grade students tended to be quickly to get bored and lose focus when using media.	
Faiz & Fazil, (2026)	Effectiveness of AI-Based Applications for Children with Mild Intellectual Disabilities: Perspectives of Special Education Teachers	A quantitative study using a survey design	AI-based applications were rated as effective and easy to use by special education teachers as a means to support the learning of children with mild intellectual disabilities. AI helps create that is more personalize learning experiences, increasing engagement,and improving the learning process..	According to a study and available data available, it was found that AI based applications AI based applications are perceived by teachers as effective and easy to use in teaching students with mild intellectual disabilities. However, their implementation faces many challenges in the form of limited human resources, infrastructure, institutional support, and This study is still limited to

Author	Title	Method	Results	Findings
				teachers perceptions; therefore, further research on development and experimental test interactive AI assisted learning media
Faiz & Fazil, (2025)	Improving Memory in Boys with Mild Intellectual Disabilities Through Artificial Intelligence-Based Mobile Apps: A Single Subject Study.	A single subject experimental design.	The use of AI-based mobile apps has been shown to be effective in improving memory function in children with mild intellectual disability. Through 12 week intervention, there was an improvement in memory that was significant and persisted to some extent after the intervention ended.	AI assisted directly to students with intellectual disabilities in or non specialized. The results of of the study show that the use of AI based can improving memory skills in children with mild intellectual disabilities signifi cantly. This is due to becaus e the app is designed to incorporate repetitive practice and that structured and materials tailored to each child's individual abilities of the child. However, that said, when using AI is discontinued, a decline in performance

Author	Title	Method	Results	Findings
				occurs, so a strategy is needed to maintain memory children long term a long time after the app was stopped. These These findings indicate that AI has the potential to help students with intellectual disabilities improve their retention for learning material; however, further research is still needed that focuses on the development of AI-based media based on the characteristics, needs, and learning materials for students with intellectual disabilities.
Karuppasamy , (2025)	Challenges in the Adoption of AI for Equity and Accessibilit y for Children with Intellectual Disabilities	Mixed methods	AI has been proven effective in improving motivation and learning outcomes students with intellectual disabilities; however, regarding the social and	Research research findings indicate AI has significant potential to be applied in the education sector to help students with intellectual disabilities

Author	Title	Method	Results	Findings
			emotional development of children are lower.	improve their learning outcomes; however, its implementation faces various obstacles that in page cost high and still limited infrastructure, a lack of training, and privacy and security data, as well as limited access and local local culture.
Hussein et al., (2025)	Investigation into the Applications of Artificial Intelligence (AI) in Special Education: A Literature Review	Literature Review	The Use of AI in special education has been shown to improve the quality of learning and learning outcomes of students with disabilities through an individualized approach and adaptive approaches. AI supports various aspects such as academics, communication, emotional, and physical independence.	Research findings identify five key areas where AI plays a significantly in supporting students with disabilities, namely: 1. Individualized learning using Intelligent Tutoring System (ITS) and an adaptive platforms designed to meet students' learning needs to improve academic achievement. 2. Communicatio n support utilizing voice

Author	Title	Method	Results	Findings
				recognition voice can Helping students with language disorders or speech disorders so that they can express themselves and interact more independentl y. 3. Cognitive and behavioral interventions utilizing AI to help track behavioral patterns and detect emotional states, thereby helping teachers in designing appropriate interventions . 4. Emotional support by utilizing emotion recognition technology; this is useful for helping students regulate their emotions when they are anxious or angry. 5. Physical independenc

Author	Title	Method	Results	Findings
				e by utilizing an assistive robot and prosthetic bridge in improving students' physical abilities of students in performing activities in the school environment.
				Although effective, it turns out that the use of AI in the field of special education faces several challenges namely disparities in access and infrastructure, teachers, and ethics and privacy, as well as that varies from region to region region.
Quinaluisa-Narváez & Estévez-Marín, (2025)	Impact of Artificial Intelligence on Special Needs Education	Mixed-methods approach	The use of AI in special needs education has great potential great for individualized learning, improving accessibility, and supporting emotional development. AI-based technology has proven effective at increasing	Research findings reveal that AI has the potential to support learning activities at schools. However, the implementation of AI in the field still faces structural and ethical ethical namely, namely the global

Author	Title	Method	Results	Findings
			engagement and reducing anxiety in learning and support the regulation of emotional regulation in students through intellectual barriers	digital divide, the readiness of readiness, and the risk of dependence Excessive reliance on AI, ethical and privacy issues data. Thus, AI is not a substitute for the role of teachers, but rather a tool to expand access to learning. Therefore, the application of AI in the future must be designed to be be on people and strengthe ning teachers' competencies in the use of AI.
Faiz & Fazil, (2024)	The Benefits of Artificial Intelligence Mobile Applications in Improving Learning for Children with Intellectual Disabilities: A Pilot Study Perspectives from Special Education Teachers	Quantitative study using a survey design	The use of AI-based mobile applications can improve the learning abilities of children with intellectual disabilities. From the perspective special education teachers, AI facilitates that is individualized, interactive, and adaptive learning, thereby improving	Data for this study was obtained from a surveyon teachers perceptions regarding and did not measuring changes learning outcomes directly, so the effectiveness of the app cannot yet be concluded. However, this study can serve as a foundation for

Author	Title	Method	Results	Findings
			attention, motivation, learning, independence, and student self confidence	the development of AI-assisted interactive learning media AI with content and design tailored to the characteristics of students with intellectual disabilities.
Arjanti et al., (2024)	TuChA (Application for Children with Intellectual Disabilities) : An Artificial Intelligence -Based Learning Tool for Children with Intellectual Disabilities	Qualitative descriptive study using a questionnaire	The use of the TuChA (Tunagrahita Children Application) app based on AI can help increase interest in learning and comprehension of students with intellectual disabilities, particularly in recognizingparts of of plants. This facilitates learning through the classification (roots, stems, leaves), although it still has limitations when processing data in large volumes.	AI based "TuChA" has been tested on students with intellectual disabilities and has shown good results in improving conceptual understanding of the material. However, due to the limited number of respondents, research sites, and evidence e regarding learning outcomes, the effectiveness of the application cannot yet be generalized more broadly.
Wulandari et al., (2024)	The Use of Artificial Intelligence in Numerical Geometry Learning for	A literature review using a qualitative descriptive approach.	The use of AI can help teachers develop learning materials that are more interactive,	The of the study reveal that the application of AI in learning can increase the motivation, engagement,

Author	Title	Method	Results	Findings
	Students with Mild Intellectual Disabilities		engaging, and easy to understand, thereby improving students' understanding of geometric concepts as well as of students with intellectual disabilities in applying it in everyday life.	and learning outcomes of students with intellectual disabilities compared to conventional methods. However, Based on the interview results, it was shown that the application of technology AI in schools varies from school those who have adopted technology and those who still use conventional media. On the other hand, hand, the use of mobile devices or laptops in the classroom can be misused by students to access content unrelated.
Almufareh et al., (2023)	Intellectual Disability and Technology: An Artificial Intelligence Perspective and Framework	A systematic literature review guided by PRISMA	AI serves as a to provide communication support, early diagnosis, and therapy tailored to the needs of individuals with intellectual disabilities. AI also helps enhance independence, quality of life, and inclusivity	The reveal that the application of has significant potential in addressing intellectual disabilities, as AI technology can be designed to integrate medical diagnostic data, individual therapy, and

Author	Title	Method	Results	Findings
			through various technologies such as automatic captions, robots, and virtual reality. Thus, AI integration can strengthen educational services and support for individuals with intellectual disabilities so they can develop more optimally in society.	learning, as well as provide tools to assist with communication . However, support is needed in integrating framework for a systematic diagnostic process, adherence to ethics and data privacy, as well as strong collaboration between AI technology and users are needed so that improve the quality of quality of life for people with intellectual disabilities. On the other hand, there are obstacles in terms of costs and supporting infrastructure in remote areas that is adequate.

Discussion

The application of AI-assisted technology in special education is growing rapidly, driven by the need to address the challenges of differentiated instruction for students with special needs. In general, the use of AI can help teachers design individualized and adaptive learning experiences; however, a review of selected literature indicates that effectiveness varies depending on the type of AI application, the characteristics of the study subjects, and the availability of resources.

The types of AI used to support learning fall into several categories: generative AI and multimodal media, AI-based applications, and machine learning-based

algorithms. The use of AI in SmartHands is designed to integrate multimodal instructions aimed at providing step-by-step, structured guidance for daily activities and the independence of students with intellectual disabilities. In another aspect, the MaTHiSiS platform is designed to tailor learning content directly based on students' emotional and cognitive states (Nursanti et al., 2026). Generative AI and multimodal media, such as Suno AI and Google AI Studio, are used to provide audiovisual stimulation for teaching vowel recognition to students with intellectual disabilities (Siagian et al., 2026). Additionally, AI-based educational mobile apps such as AutiSpark, Khan Academy Kids, Happy Kids, Daily Tasks, and Luca & Friends are designed to provide immediate aimed at making learning interactive and developing thinking skills, fine motor skills, and language skills (Faiz & Fazil, 2024).

Research studies highlight the heterogeneity of the study subjects, which consist of students with intellectual disabilities, differences in individual learning styles, and educators and teachers in special education schools. For students with intellectual disabilities, the use of AI is designed to provide concrete experiences, repetition, and continuous training of attention span (Faiz & Fazil, 2024; Nursanti et al., 2026; Siagian et al., 2026). Participants with diverse individual learning styles demonstrated that, despite sharing the same challenges, they do not necessarily share the same learning styles. Research data indicate that students with intellectual disabilities in fourth grade are more responsive to tactile or kinesthetic media, whereas fifth-grade students are more responsive to audio, visual, and AI-based interactive media (Siagian et al., 2026). Regarding educators and special education teachers, the findings indicate that teachers' perceptions of AI's effectiveness vary based on academic qualifications and job level, with teachers holding higher academic degrees demonstrating greater enthusiasm for the use of AI (Faiz & Fazil, 2024).

An analysis of the research designs in the selected articles reveals the application of three main methodological approaches: qualitative descriptive and case studies or naturalistic phenomenology; quantitative surveys (pilot studies); and systematic literature reviews. Qualitative descriptive and case study designs, as seen in the research by Nursanti et al., (2026) and Siagian et al., (2026), have proven highly effective in exploring changes in behavior, classroom situations, emotional responses, and social interactions among participants in greater depth. Quantitative surveys using closed-ended questionnaires, as seen in the study by Faiz & Fazil, (2024), were used to measure teachers' perceptions; the analysis was conducted using descriptive and inferential tests aimed at examining differences in variables from a demographic perspective. Another research design is the systematic literature review. This design, as seen in the study by Hussein et al., (2025), which followed the PRISMA guidelines, analyzed 15 selected studies to identify trends in the success and challenges of implementing AI for students with intellectual disabilities and special education schools from a macro perspective.

An analysis of the strength of the evidence and potential biases can be found in the study by Faiz & Fazil, (2024), which relied on teachers' perceptions rather than direct measurements of students knowledge levels. On the other hand, there are also limitations regarding the validity of the sample due to its small size. As in the studies conducted by Nursanti et al., (2026) and Siagian et al., (2026), the small sample size limits the generalizability of the findings and necessitates larger-scale testing.

The results across the analyzed studies show a consistent pattern regarding improvements in engagement and attention, individuality and independence, as well as barriers infrastructure, and digital literacy. All studies revealed that the use of AI-based media can improve the focus, motivation, and engagement of

students with intellectual disabilities in learning compared to conventional methods. Other findings indicate that AI integration can enhance independence and memory retention through structured instructions and immediate feedback. Similar challenges in the widespread implementation of AI as a learning tool were highlighted across all studies, including limited access to devices, ethical and data privacy concerns, unstable internet connections, and a lack of training for teachers in special education schools.

Based on the results of this study, it is understood that the use of AI in special education for students with intellectual disabilities is not a substitute for the teacher's role in learning, but rather a means or supporting tool in achieving learning objectives. The combination of AI-based tactile and digital media has proven to be an ideal approach to accommodate the diversity of students in special education schools.

Conclusion

Based on the results and discussion, it was concluded that there are limitations in the number of relevant studies, as well as in the variety and representativeness of the student samples, which were limited in the literature review. On the other hand, there was no direct statistical analysis, as the research did not involve the direct collection of primary data. Thus, no statistical analysis was conducted to establish a cause-and-effect relationship between the use of AI and improvements in the abilities of students with intellectual disabilities.

Teachers can utilize AI to design adaptive learning materials tailored to students' individual characteristics, which has the potential to improve student learning outcomes, engagement, and motivation compared to conventional teaching methods; however, its effectiveness still depends on the resources and type of AI used. In its implementation, various challenges are encountered, including students' characteristics and levels of intellectual disabilities, limitations of devices, data ethics and privacy concerns, unstable internet connections, and a lack of training for teachers in special education schools.

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Ethical Statement

Ethical approval was not required for this study because it was conducted exclusively through a literature review of previously published research and did not involve direct interaction with human participants, collection of personal data, or experimental procedures. The authors adhered to principles of academic integrity, proper citation, and responsible interpretation of the reviewed literature.

Artificial Intelligence (AI) Use Statement

The authors declare that artificial intelligence (AI) tools were used solely to assist with language editing, grammatical correction, and improving the clarity and readability of the manuscript. AI tools were not used to select the reviewed studies, extract research findings, conduct critical analysis, or formulate research conclusions. All scholarly content, interpretations, and references were reviewed and verified by the authors, who take full responsibility for the accuracy and integrity of the manuscript.

Author Contributions

Aceng Rosadi contributed to the conceptualization, literature searching, study selection, data extraction, critical analysis, synthesis of findings, and preparation of the original manuscript. Muhammad Efendi contributed to the conceptualization, methodological development, research supervision, validation of the literature synthesis, and critical review of the manuscript. Ediyanto contributed to methodological refinement, interpretation of findings, validation of the conceptual framework, and manuscript review and editing. All authors reviewed and approved the final version of the manuscript.

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Conflict of Interest Statement

The authors declare that they have no financial, professional, institutional, or personal conflicts of interest that could have influenced the conduct, interpretation, or publication of this study.

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