

# Transforming Special Education with AI: A Multi-Stakeholder Study



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*AI significantly enhances special education by delivering individualized and adaptable learning experiences customized to the distinct needs of children with disabilities. As there are limited studies on the application of AI in special education, this research tries to find out the experiences of educators and students by conducting a multistakeholder study using interview method for collecting data from 10 teachers and 75 differently-abled students in Ernakulam. The study results indicated that AI tools significantly improve academic engagement and outcomes for students with disabilities.*

**Keywords:** Artificial Intelligence, Special Education, Differently Abled Students, Thematic Analysis

## 1. Introduction

Artificial Intelligence (AI) is swiftly revolutionizing multiple sectors, including education. The use of AI technology in educational environments is transforming the processes of teaching and learning, providing novel answers to longstanding difficulties. Artificial intelligence can customize educational experiences by tailoring content to the specific needs of each learner, thus improving engagement and comprehension. Especially AI significantly enhances special education by delivering individualized and adaptable learning experiences customized to the distinct needs of children with disabilities. AI-driven systems may evaluate individual learning styles and challenges, allowing educators to formulate tailored educational tactics that enhance engagement and academic achievement (Garg & Sharma, 2020). AI-driven applications can provide instantaneous feedback and assistance, enabling students with communication difficulties or learning disabilities to engage more proficiently with instructional material. Furthermore, AI technologies enable the creation of assistive equipment, such as speech recognition software and interactive learning platforms, which permit students with varied capacities to engage comprehensively in the educational process. Utilizing AI, educators can establish inclusive environments that promote independence, motivation, and success among children with exceptional needs, thereby enhancing educational equity. The review shows that many scholars have conducted research on the topic AI in education, its advantages and challenges. Very few studies have been conducted in the area of the application of AI in special education. The review clearly shows that more research have to be conducted in this area to find out the perceptions and experiences of educators, and students regarding the usability, accessibility, and implications of AI tools in special education. And also to answer the question how effective are AI-driven tools in improving engagement among students with different types of disabilities in special education settings? This research tries to address this issue by conducting a multistakeholder study using qualitative methodology. The study used interview method for collecting data from 10 teachers and 75 differently abled students.

## 2. Literature Review

A.S. Drigas and R.-E. Ioannidou (2013) in their study using literature review examined the role of AI in diagnosing and supporting students with special educational needs (SEN). It highlights AI's effectiveness in diagnosis through methods like neural networks and fuzzy logic, which improve accuracy in identifying conditions such as autism, ADHD, and dyslexia. For instance, fuzzy cognitive maps help distinguish specific language impairments, while artificial neural networks aid in detecting autism and dyslexia. In intervention, AI-driven tools like Intelligent Tutoring Systems (e.g., Active Math for math education), speech therapy systems (e.g., LOGOMON), and social scenario-based platforms for children with autism provide personalized and adaptive learning experiences. The authors conclude that AI holds significant potential to enhance diagnostic precision and individualized interventions but emphasize the need for further research to standardize tools and address a wider range of disabilities. The paper underscores AI's promise in advancing educational outcomes for SEN students and the importance of continued development and evaluation.

Xia Han et al (2022) explored the potential of artificial intelligence (AI) in transforming special education in China, emphasizing its role in addressing the needs of the growing population with disabilities and helping them integrate into society. While school enrollment for students with disabilities has increased, challenges such as resource limitations, a shortage of trained teachers, and diverse educational needs persist. AI offers solutions in three key areas: assisting teachers by enabling personalized learning and progress tracking through technologies like machine learning and speech recognition; supporting students by adapting educational content and introducing tools like virtual reality, brain-computer interfaces, and rehabilitation robots; and helping parents supervise by monitoring children's progress, behavior, and safety. However, the

document highlights challenges such as privacy concerns and the necessity of standardized practices to ensure consistent and effective integration of AI solutions.

Barua, P.D et al (2022) using systematic review aims to (1) examine how AI technologies have been applied to assist students with these common NDDs and (2) identify limitations in current AI tools to recommend future directions for improving personalized education Childhood-onset mental disorders (MDs), particularly neurodevelopmental disorders (NDDs) such as ADHD, dyslexia, and autism spectrum disorders (ASDs), significantly impact individuals, families, and society, emphasizing the need for effective recognition and treatment.. Despite being in its early stages, AI-assisted tools have shown positive impacts on the learning outcomes and quality of life for children with NDDs, with most studies focusing on ASD. These tools have been well-received by teachers, parents, and therapists and have demonstrated feasibility in educational and therapeutic settings. AI techniques have enabled greater independence in children's learning, helping them achieve individualized goals. However, existing tools face limitations, such as a lack of cloud-based integration, restricting their ability to deliver real-time, personalized learning suggestions. The review underscores the need for further development and evaluation of AI technologies to mainstream these approaches and maximize their impact, particularly by leveraging cloud systems for dynamic, tailored educational experiences.

Panjwani-Charani, S. & Zhai, X. et al using review examined how artificial intelligence (AI) has been utilized to support students with learning disabilities (SWLDs). Among 16 studies reviewed, 10 focused on dyslexia, one on dyscalculia, and the rest addressed learning disabilities more broadly, with only half focusing on school-age children. Seven types of AI applications were identified, including adaptive learning (the most widely used), facial expression analysis, chatbots, communication assistants, mastery learning tools, intelligent tutors, and interactive robots. Using the SAMR-LD model (substitute, augment, modify, and redefine—learning disability), the review categorized AI applications across four levels: 4 substitution, 6 augmentation, 2 modification, and 4 redefinition. The findings highlight AI's potential to support SWLDs but also point to significant gaps, particularly the lack of empirical studies exploring AI's role beyond identification and diagnosis, underscoring the need for further research to expand its applications.

Victor Aliu., T. (2023) using the method of literature review examined the application of Artificial Intelligence (AI) in special education over the past two decades, focusing on its role in enhancing support for students with Special Educational Needs (SEN). It highlights AI's contributions to assessment, diagnosis, and intervention, using tools such as expert systems and intelligent agents to address challenges like autism, dyslexia, and ADHD. Assistive Technologies (AT), including speech-to-text systems and language models, are shown to improve communication and personalized learning experiences for students with disabilities. A key theme is the potential of Large Language Models (LLMs) as AT tools, offering adaptive learning plans and real-time support for unique learning needs. The review also addresses challenges such as limited diagnostic tools and accessibility barriers, particularly in developing countries like Nigeria, and emphasizes the need for further research to expand AI applications and promote more inclusive and equitable educational practices.

Marino et al. (2023) in his study examined how AI is transforming special education by enhancing tools for students with disabilities. It explores AI's history, current applications in writing, tutoring, and assessments, and its potential to provide personalized learning and improve accessibility. Ethical concerns, including privacy, bias, and the role of AI as a cognitive aid, are also discussed. The authors stress the need for thoughtful policies to guide AI's educational use, highlighting its potential to empower students and support teachers while cautioning against risks like data misuse. The article concluded with a call for further research to better understand AI's impact on special education and ensure its ethical and inclusive integration.

Artificial Intelligence (AI) has significantly influenced the educational sector, enhancing inclusivity and accessibility for students with visual, hearing, mobility, and intellectual disabilities. Beyond benefiting students with special needs, AI has also helped educational institutions adopt inclusive pedagogical approaches. The working paper of Garg and Sharma (2020) analyzes the impact of AI on education for students with special needs, drawing on qualitative research conducted through focused interviews with teachers and students, as well as literature sourced from academic databases like EBSCO, newspapers, magazines, and blogs. The responses were examined using content analysis, with a particular focus on the themes of AI's role in special education and its assistance to teachers in promoting inclusive practices. The study also proposed a framework for an inclusive future in special education based on insights from the interviews.

The reviewed literature highlights the transformative potential of Artificial Intelligence (AI) in special education, emphasizing its applications in diagnosis, intervention, and personalized learning. Studies like those by Han et al. (2022) and Garg & Sharma (2020) underscore AI's role in addressing challenges faced by students with disabilities, such as resource constraints, lack of trained teachers, and diverse needs, through tools like virtual reality, brain-computer interfaces, and intelligent systems. Similarly, Drigas and Ioannidou (2013) and Aliu (2023) demonstrate the effectiveness of AI-driven diagnostic tools and assistive technologies in enhancing learning outcomes for students with Special Educational Needs (SEN), particularly in autism, dyslexia, and ADHD. Barua et al. (2022) and Panjwani-Charani & Zhai (2023) extend this analysis to neurodevelopmental disorders (NDDs) and learning disabilities, identifying AI applications like adaptive learning, chatbots, and interactive robots as valuable tools, albeit with gaps in cloud integration and real-time personalization.

Despite these advancements, the research reveals critical gaps. Ethical concerns such as data privacy, standardization challenges, and limited empirical studies restrict AI's potential. Most studies focus narrowly on specific conditions like autism or dyslexia, with minimal exploration of broader or underrepresented disabilities. Also majority of the researches were highlighted the importance of AI in special education using secondary literature rather than empirical evidence. Hence it is

necessary to conduct more empirical research in this area as each student is differently abled and the impact of AI on special education is multidimensional.

### 3. Study Methodology

The study was based on both primary and secondary data. The primary data was collected from two special schools from Ernakulam district. The study employed purposive sampling method, and the data was collected by conducting face-to-face interviews with 10 teachers and 75 students. The teachers and parents assisted in collecting data from the students, as some were unable to provide accurate responses on their own. Both closed-end and open-end questions were asked. The data was collected in the month of October and November 2024. The secondary data was collected from books, e-resources, reports and academic journals.

#### ANALYSIS & RESULT

The first section include the analysis of data collected from students and the second presents the analysis of data collected from teachers. The following Table 1 presents the summary of demographic details of students.

**Table 1** Demographic Details of Students

	GROUPS	NUMBER OF STUDENTS	PERCENTAGE
Gender	MALE	66	88%
	FEMALE	9	12%
AGE	0-10	10	13.33%
	10-20	25	33.33%
	20-30	38	50.67%
	30-40	2	2.67%
Types Of Disabilities	Muscular Dystrophy	5	6.67%
	Cerebral Palsy	4	5.33%
	Learning Disability	10	13.33%
	Smith - Magenis Syndrome	1	1.33%
	Autism	10	13.33%
	Down Syndrome	12	16%
	ADHD	13	17.33%
	Intellectual Disability	20	26.67%

Source: Primary Data

In order to understand the opinion of students on the usage of AI tools, the following questions were asked and the responses were presented in Table 2.

**Table 2** Responses of Students Regarding the usage of AI Tools in Education

Questions Asked	Responses	Percentage
Do you find it interesting to use AI tools?	Yes	100%
	No	0%
Do you feel that AI tools improve your learning experience?	Yes	100%
	No	0%
Do you find AI tools easy to use?	Yes	80%
	No	20%
Do AI-driven tools help you communicate more easily with others?	Yes	80%
	No	20%
Do you ever get frustrated with the AI tools you use?	Yes	8%
	No	80%
	Sometimes	12%
Do you feel more independent using AI technologies?	Agree	80%
	Disagree	4%
	Somewhat Agree	16%
Would you like more AI tools to be integrated into your education?	Yes	100%
	No	0%

Source: Primary Data

From the above table, it is clear that majority of the students find it interesting to learn using AI tools, and also confirms that AI tools improve their learning experience. Many of them were able to communicate better, express their inner emotions, and convey their needs more efficiently. The majority of them felt independent using AI tools. The students also like to have more AI tools in education.

#### The Analysis of Data Collected from Teachers

All the teachers interviewed were female and the majority belonged to the age group of 30 to 40 (70%). A total of 10 teachers

were interviewed and the results were presented in the following table 2 which includes the questions asked and the summary of responses. The study's data was gathered from two institutions: one fully integrated with AI and the other partially integrated due to financial limitations.

**Table 3** Summary of Responses from Teachers

Qns No	Questions asked	Summary of responses
1	Which are the AI tools used in your school?	Photoshop, AI Prompt, Psycho motor tool, Ideogram
2	Do children with special needs find it difficult to incorporate AI tools in their studying?	The response was 'yes' it is difficult, and they responded that it depends on the child and his/her special need, their interest, and ability to grasp information.
3	Is it easier to teach how to use AI tools in their studying?	The responses were 'No, it is not easy', and they responded that initially a great support has to be given to them to teach AI tools and the learning period extended from one week to 6 months depending on their special needs.
4	Are AI tools found to be engaging the children with special needs in their studying?	The responses were 'Yes', they said that AI tools are found to be engaging children with special needs especially with this introduction providing a personalized learning experience enabling better understanding.
5.	Time spent on learning different AI programs	The amount of time spent learning various AI programs depend on the individual child and their level of learning, as well as the complexity of the program, the resources available, and the child's familiarity with technology.
6	Limitation of using AI in special education	The teachers responded that the major limitation is the requirement for supervision for a longer period, as well as high costs of implementation. Also they highlighted the need for specialized training for educators to effectively integrate these tools into individualized learning plans.
7	Do you think that AI-tools helps in skill development?	The response was 'yes' and they responded that AI tools helps to engage, express their creative ideas, and also provide personalized learning experiences.
	<b>Closed-end questions</b>	<b>Responses(%)</b>
1.	Do you believe AI tools improve learning outcomes for students with special needs?	Yes (100%) No (0%)
2	Do you think more AI tools should be developed to assist students with special needs?	Yes (100%) No (0%)
3	Do you think AI tools can bridge learning gaps effectively for students with special needs?	Yes (80%) No (20%)
4	Have you observed students with special needs overcoming learning challenges using AI tools?	Yes (80%) No (20%)
5	How effective do you find AI tools in addressing the learning gaps for students with special needs?	<ul style="list-style-type: none"> <li>● A. Very effective - 72%</li> <li>● B. Moderately effective - 20%</li> <li>● C. Slightly effective - 8%</li> <li>● D. Not effective- 0%</li> </ul>

Source: Primary Data

Responses from teachers indicate a significant improvement in learning by the incorporation of AI tools in special education. The teachers also confirmed that the students exhibit increased interest and engagement in utilizing AI for learning. All the teachers responded that incorporating AI in special education helps to improve learning outcomes for students, bridge learning gaps effectively for students and also help them to overcome the challenges in learning.

#### 4. Discussions of the Result & Conclusion

The field of special education faces distinct challenges that necessitate creative solutions, and this is where Artificial Intelligence (AI) can be beneficial. AI offers the potential to improve and revolutionize special education, making it more tailored, efficient, and accessible. The study was conducted to understand how the incorporation of AI helps students with special needs in their learning process. The study clearly shows that the students find it interesting to learn using AI tools, and also confirms that AI tools improve their learning experience. Many of them were able to communicate better, express their inner emotions, and convey their needs more efficiently. Majority of them felt independent using AI tools. The students also like to have more AI tools in education. Responses from teachers also indicated a significant improvement in learning by the incorporation of AI tools in special education. The teachers also confirmed that the students exhibit increased interest and engagement in utilizing AI for learning. Overall, this study intends to promote awareness of the benefits of implementing AI in special education to enhance and improve the teaching and learning experience for students with diverse needs. By integrating AI tools, educators can provide personalized support, adaptive learning pathways, and targeted resources tailored to individual abilities and learning styles. This approach not only fosters greater engagement and understanding but also empowers students to achieve their full potential, thus increasing the scope of opportunity for optimal utilization of their

abilities. Through this initiative, the study aims to demonstrate how AI can bridge gaps in accessibility, foster inclusivity, and create a more supportive and equitable educational environment for all learners. However, the small sample size is one of the major limitations of the study. More comparative studies can be conducted by taking samples from special schools adopting traditional methods with schools with AI tools in special education.

## 5. References

1. A.S. Drigas and R.-E. Ioannidou (2013) , A Review on Artificial Intelligence in Special Education ,
2. M.D. Lytras et al. (Eds.): WSKS 2011, CCIS 278, pp. 385–391, 2013.
3. Barua, P. D., Vicnesh, J., Gururajan, R., Oh, S. L., Palmer, E., Azizan, M. M., Kadri, N. A., & Acharya, U. R. (2022). Artificial Intelligence Enabled Personalised Assistive Tools to Enhance Education of Children with Neurodevelopmental Disorders—A Review. *International Journal of Environmental Research and Public Health*, 19(3), 1192. <https://doi.org/10.3390/ijerph19031192>
4. Clarke, V. and Braun, V. (2017), “Thematic analysis”, *The Journal of Positive Psychology*, Vol. 12 No. 3,pp. 297-298.
5. 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. <https://doi.org/10.18178/ijiet.2020.10.7.1418>
6. Hosni, B. A., Naidu, V. R., & Mandhari, S. A. (2023). Support for students with Special needs during and after the COVID-19 pandemic through E-learning: A Case Study. *SHS Web of Conferences*, 156, 06004. <https://doi.org/10.1051/shsconf/202315606004>
7. Marino, M. T., Vasquez, E., Dieker, L., Basham, J., & Blackorby, J. (2023). The future of artificial intelligence in special education technology. *Journal of Special Education Technology*, 38(3), 404–416. <https://doi.org/10.1177/01626434231165977>
8. Panjwani-Charani, S. & Zhai, X. (in press). AI for Students with Learning Disabilities: A
9. Systematic Review. In X. Zhai & J. Krajcik (Eds.), *Uses of Artificial Intelligence in STEM Education* (pp. xx-xx). Oxford, UK: Oxford University Press
10. Victor Aliu., T. (2023). Artificial intelligence in special education: a literature review. *Systemic Analytics*, 2 (2), 188-199.