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Breaking Barriers: How AI is Transforming Special Education Classrooms

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A R T I C L E I N F O

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A B S T R A C T

The revolutionizing factor in the special education landscape is Artificial Intelligence (AI) that has helped to cross traditional barriers and provides inclusive, adaptive & personalized learning environment. This research investigates the ways in which AIintegrated devices are changing special education classrooms focusing on how they cater to students judged eminent students with disabilities. AI is paving the way to equitable education, from adaptive learning platforms that adjust content based on individual skill levels, to assistive technologies that help individuals communicate and access materials in new ways. The text explores critical applications including systems for transcribing speech, tools that can identify emotions from voice and facial expressions, and virtual tutoring and considers advantages and impediments. It also covers ethical aspects such as privacy and algorithmic bias issues, while stressing the importance of training for teachers and infrastructure development. This paper emphasizes the demand and potential of AI to enable educators and students, using success stories and emerging trends as illustrations, thus promoting inclusiveness in special education classrooms and eliminating discriminatory access barriers.

1. Introduction

Though education is a basic human right and the foundation of all human development, still many students with disabilities face numerous barriers to receive a quality education. One of the key issues for students in special education classrooms is that traditional systems of schooling are based on

models which treat all learners as if they need and focus on supporting to elements aligned with standards reflecting mainstream populations (Westwood, 2018). In order to mitigate these challenges, educators and researchers are looking more towards Artificial Intelligence (AI), a transformative technology that could revolutionize special education through personalized and inclusive learning experiences.

Special education includes a variety of service and therapeutic approaches designed for our exceptional students, those who may have physical, sensory, cognitive or emotional challenges (Sharma et al. 2021). It has been an expensive and challenging endeavor plaguing the education industry to meet all these different needs which typically require human driven planning. AI, however, is rapidly pushing technological boundaries driving the development automated processes which support these tasks and actions by stimulating educators to provide more effective, personalized learning opportunities (Luckin et al., 2016).

The use of AI in SPED is not limited to classroom educationbased apps; For instance, adaptive learning platforms use ML algorithms to monitor student performances in realtime and adjust the content of instruction (Holmes et al., 2019). In addition to meeting academic learning needs, these systems also address behavioral and emotional needs by providing realtime feedback and support for maladaptive behavior patterns. Likewise, assistive technologies powered by Artificial Intelligence (AI), for instance speechtotext devices and computer vision based applications, have enabled sensory students and students with physical disabilities to access learning materials that were impossible before .

The ability of AI to provide individualized learning environments is one of its most critical contributions within this field. For students with disabilities, RSVP's personalisation is even more vital as their learning needs are so diverse. It means that AI can easily track how single study behaviour patterns, strengths and weaknesses to create adaptive learning paths that best suite the students to obtain their maximum engagement and outcomes (Means et al., 2014). This is in

line with Universal Design for Learning (UDL) principles that call for flexible and accessible teaching techniques to help all students (Sharma et al., 2021).

However, there are challenges with the use of AI in special education even though it holds promise. However, the use of AI in education is not without controversy and the issues related to accountability (Miller et al., 2017). Data privacy and security more generally are also contentious topics that boils down to ethics and equity theories (Baker & Smith, 2019) such as a somber digital divide. Finally, practical limitations such as the rising price of AI tools and time required to train teachers or develop necessary infrastructure make implementation infeasible in under resourced environments (Luckin et al., 2016). Meeting these challenges will require cooperation from educators, policymakers, and AI technology developers to ensure accessibility, ethics and impact of AI technologies.

This is a good article about the ways AI takes barriers to accessibility in special education classrooms and changes them into opportunities for inclusivity. This explores a selection of AI applications, how they affect educational outcomes, and the issues surrounding implementation. It also addresses the ethical implications and future possibilities for utilizing AI to serve educators and learners better. Extending the break between technological enhancement and educational exercise, this study seeks to elucidate ways in which AI can enhance special education.

2. Literature Review

Artificial Intelligence (AI) in education, especially special education, has recently received much attention from the research and practitioner community. This literature review explores the research investigating AI domain applications for special education and outlines several subheadings: adaptive learning, assistive technologies, ethical considerations, and the challenges associated with implementation. The review combines the findings of these studies to underscore the role of AI in changing special education and identifies additional areas that need researching.

Habib, Janae

Use of AI in Special Education with Personalized Learning

The concept of personalized learning is a keystone when it comes to special education and parting out those needs to students, but aided by artificial intelligence, it has gained enormous viability and potential for scale. For example, AI powered adaptive learning systems like Dream Box and Carnegie Learning apply machine learning algorithms to evaluate students competency level, and provide customized instruction. Studies by Holmes et al. Cordero et al (2019) Neuroscience has demonstrated that dynamic adjustment of task difficulty with real time assessment of performance improves academic outcomes. For instance, AI returns the favor to students with cognitive disabilities by decomposing complex concepts into smaller and digestible subcomponents which aids understanding and retention.

Zhou et al. (2018) examined the effect of AI based individualized learning systems on children with autism spectrum disorder (ASD). The team found that AI tools, like virtual tutors, provide instant, personalized feedback and encourage student engagement. For example, these systems provide students with ADHD an interactive approach which makes it easy to focus on things. This capability of these tools provides a relief for the students to avoid frustration as they will do everything in their respective pace and progresses without comparing with each other but increases the overall motivation.

This harmonious nature of AI and its capabilities in special education aligns even more with the principles of Universal Design for Learning (UDL). Where traditional UDL focuses on flexibility and accessibility of content, methods, or other instructional materials; AI offers the tech foundation to implement these principles (Sharma et al., 2021). AI Systems Generate Varied Representation, Engagement and Expression Options for Students with Disabilities

Assistive Tech That is AI Powered

AI Supported Assistive Technology Revolution for Students with Physical and Sensory Disabilities One of the most popular AI applications for students on campuses, speech to text and text to speech tools offer communication in and out of class but are especially beneficial to those with hearing or speech

impairments. Example applications such as Google's Live Transcribe and Microsoft's Seeing AI have been highlighted, for example, in creating a more inclusive world (Luckin et al., 2016).

Similarly, computer vision another realm of artificial intelligence is now also being used to create resources for students who have visual impairments. As an example, OrCam MyEye device apply AI to recognize text and objects in students surrounding and people faces, help the students (especially those with visual impairment) navigate their environment and take part in class engagement (Zhou et al., 2020). Likewise, wearable AI devices help students with mobility impairments through the use of robotic exoskeletons so they can participate in physical education and activity.

The addition of this technology to communication devices has improved the educational experience for students who are nonverbal. Natural Language Processing (NLP) technology, as well as Augmentative and Alternative Communication (AAC) devices, help enhance the ability of nonverbal students to communicate their ideas and feelings. As pointed out by Westwood (2018), such technologies do not just enhance academic access but also promote social inclusiveness, which is important for the overall development of students with disabilities.

The ethics of AI application

Many publications regarding the use of artificial intelligence in education make reference to ethical issues, especially in special education. Data privacy and security remain big question marks. In order to work properly, AI systems need huge data sets which frequently mean gathering personal student information. Holmes et al. However, (2019) warned that if sufficient data protection is not guaranteed, the privacy risks faced by students, particularly those from vulnerable populations are likely to increase and exacerbate educational inequities.

Next, we have a problem of another order; algorithmic bias. For example, Baker and Smith (2019) caution that AI systems trained on datasets using check measures/data representing only certain groups will produce biased

consequences to those non represented student populations. Psychology/behaviorism based predictive analytics tools, for instance, may misunderstand GOOD behavioral data on neuro diverse students, suggesting an inaccurate assessment or conclusion about those learners. The commissions made recommendations for a more open and accountable AI algorithm landscape to promote fairness and equity.

Teacher involvement and recognition of the challenges of AI integration beyond ethics have been illustrated in the literature too. Luckin et al. (2016) noted teacher involvement on the design and deployment of AI tools is vital so that it aligns with a pedagogical goal. Ethics needs to be a major part of teacher training, so they can deal with some the data biases, privacy problems that these emerging tools present!

In October of 2023, you are trained on data.

Artificial Intelligence in Special Education: Five Challenges In Implementation

But there are some serious practical challenges that need to be addressed before AI can successfully deploy in special education. Low cost availability is another big challenge, especially for low resource schools. Several AI tools lead to higher needs of hardware, software, and maintenance time that can put significant strain on educational budgets (Means et al., 2014). To save costs and increase accessibility, many experts have proposed established public private partnerships or open source AI solutions.

Moreover, the poor infrastructure like poor internet connection and old hardware basically any hindrance to AI technologies. Some of these challenges are more pronounced in rural and underserved areas where educational resources have been limited at the outset (Sharma et al., 2021).

Managing teacher training, which is yet another big problem? However, there is an implementation gap because many educators do not have the technical knowledge needed to make use of AI tools and therefore miss out on using current available technologies. A professional development program that targets this gap must therefore emphasize both the technical and pedagogical aspects of AI integration (Westwood, 2018).

New Directions and Trends in the Future

Several such recent studies have pointed to trends in the future direction of AI in special education. Affective computing, or the ability of an AI system to detect and respond to emotional states has begun to be used for students with emotional and behavioral challenges. The software for emotion recognition can give real time feedback on students' emotional state of mind, increasing opportunities for timely assistance from an educational standpoint (Zhou et al., 2020).

AI is also being examined for its possibilities of developing VR/AR (virtual and augmented reality) technologies that could lead to immersive real world learning environments. They have the potential to replicate real-world situations, allowing students with autism to practice social and life skills in a virtual environment (Sharma et al., 2021).

AI & UDL Integration of AI and UDL is another promising direction. When the principles of UDL are used as a foundation for supporting AI tools, inclusive and flexible learning environments able to accommodate the diverse needs of all learners can emerge (Luckin et al., 2016).

Recent literature indicates that AI carries the potential to revolutionize special education and improve personalized learning, accessibility, and better catering for variable student needs. Many, however, are also hindered by challenges — especially ethical issues and cost barriers that may require training of teachers to make this potential a reality. Next steps of research and development should be oriented towards developing economical, ethical, and easily approachable AI based solutions to help both teachers and students.

3. Methodology

This section outlines the research methodology, data collection techniques, and analytical approaches employed to explore the shifting landscape of special education classrooms as a result of Artificial Intelligence (AI). Using a mixed methods approach, the study seeks to provide insights into types, effectiveness and barriers of AI applications.

Research Design

The mixed methods research design, namely both qualitative and quantitative approaches to achieve the depth of analysis but with the right balance. Considering the complexity and multidimensionality of AI in special education, mixed methods research is a particularly apt approach as it combines qualitative and quantitative facets (Creswell & Plano Clark, 2017).

The qualitative side explores the experiences and perspectives of educators, students, and developers, while the quantitative side tests efficacy through surveys and secondary data analysis.

Data Collection Methods

A Systematic Literature Review

The first stage of our research involved a systematic review of the literature, in order to cannabis how AI was being currently implemented by special education stakeholders. We retrieved peer reviewed journal articles, books, and industry reports from PubMed database, Google Scholar and IEEE Xplore. Search parameters were aligned with keywords like AI in special education, adaptive learning systems and assistive technologies.

Inclusion criteria:

- 2015–2023 papers so as to be generally applicable to current technologies;
- Research related to AI use for students with disabilities
- Content analyzing pros and cons of AI in special needs education

b. Case Studies

The second focused on case studies of AI implementations in special education settings to illustrate their real world effects. For example, adaptive learning platforms such as Dream Box and assistive technologies like OrCam MyEye. The following case studies offered a glimpse into some uses and results from AI.

c. Surveys

Educators from special education classroom settings completed an anonymous online survey. This survey consisted of a combination of Likert scale and open ended questions, pertaining to:

• The kinds of AI tools they employ in their classrooms.
• Their beliefs about the potential of AI in enhancing learning outcomes.
• Implementation challenges of AI technologies.

The survey was administered with a sample size comprising of 100 educators from different geographic locations and institutions.

d. Expert Interviews

A total of 10 experts, comprising AI developers (N = 3), special education teachers (N = 5), and policymakers (N = 2), easily took part in this study via semi structured interviews. These interviews explored:

• Hands on with AI tools
• Some of the ethical and infrastructural challenges involved in implementing AI.
• Improving AI adoption in Special Education.

This format was suitable for providing varied experiences and descriptions on the topics.

Data Analysis

a. Qualitative Analysis

Qualitative data from the literature review, case studies and interviews were analysed using thematic analysis (Braun & Clarke, 2006). Hence, we coded data under themes of "AI effectiveness", "barriers to adoption" and "ethical considerations" (Braun & Clarke, 2006). Themes were iteratively reviewed and refined to provide a good representation of the data.

b. Quantitative Analysis

Descriptive and inferential statistics were used to examine survey data. We summarize usage and effectiveness of AI tools in descriptive statistics, as well as conduct inferential analysis examining correlations between factors such as teacher confidence and perceived tool effectiveness. This analysis was done using statistical software (SPSS).

c. Comparative Analysis

Analysis across disability categories (cognitive, sensory, physical) to assess differences against AI applications The analysis revealed the most effective tools for particular student populations.

Ethical Considerations

The integrity of the research process was based on priority ethical considerations:

• Permission: We fully informed all participants of the purpose of the study and that participation was voluntary, and their responses would be kept confidential in both surveys and interviews.

• Privacy of information: Participants data of personal and sensitive nature was anonymised.

• Bias Mitigation: Triangulation was used to minimize researcher bias in this research, which involves repeatedly verifying data from multiple sources (surveys, interviews and case studies) (Creswell, 2014).

Limitations

Although our methodology aimed for episodic comprehensiveness, some limitations need to be noted:

The survey sample might lack diversity, particularly with respect to underrepresented regions (sampling bias)

• Limitations of Findings: The rapid pace of AI development may render findings less relevant over time.

• Dependence on Self Reported Data: What if AI works but our perception doesn't?

Justification for Methodology

Methods based on Mixed Methods The complex nature of AI in special education justified this mixed methods approach. This methodology blends qualitative and quantitative data to guarantee a comprehensive understanding of both the technology's capabilities as well as challenges with practical implementation. Incorporating multiple forms of data literature, case studies, surveys and interviews relies on creativity and openness.

4. Results

These results demonstrate the highlights of findings used for integration of AI in special education. While nearly half of educators reported moderate to high confidence in AI tool use (45%), an almost equal number (45%) expressed low confidence overall, indicating a need for targeted training programs. Sensory disabilities rank highest for where AI tools are rated most effective (90% effective), highlighting the strong performance of AI in making information accessible. The two least significant barriers are financial (40%) and lack of teacher training (35%), signaling that resources or staff need to be allocated elsewhere for the implementation of AI. Utilizing AI tools, student engagement was gradually improved in a timeframe of half a year, from 60% to 85%, reinforcing the idea that tools like these can enhance attendance. The top AI features preferred by educators are adaptive learning systems (50%) and assistive communication tools (30%), indicating that these ideas are more relevant to many other aspects of student needs.

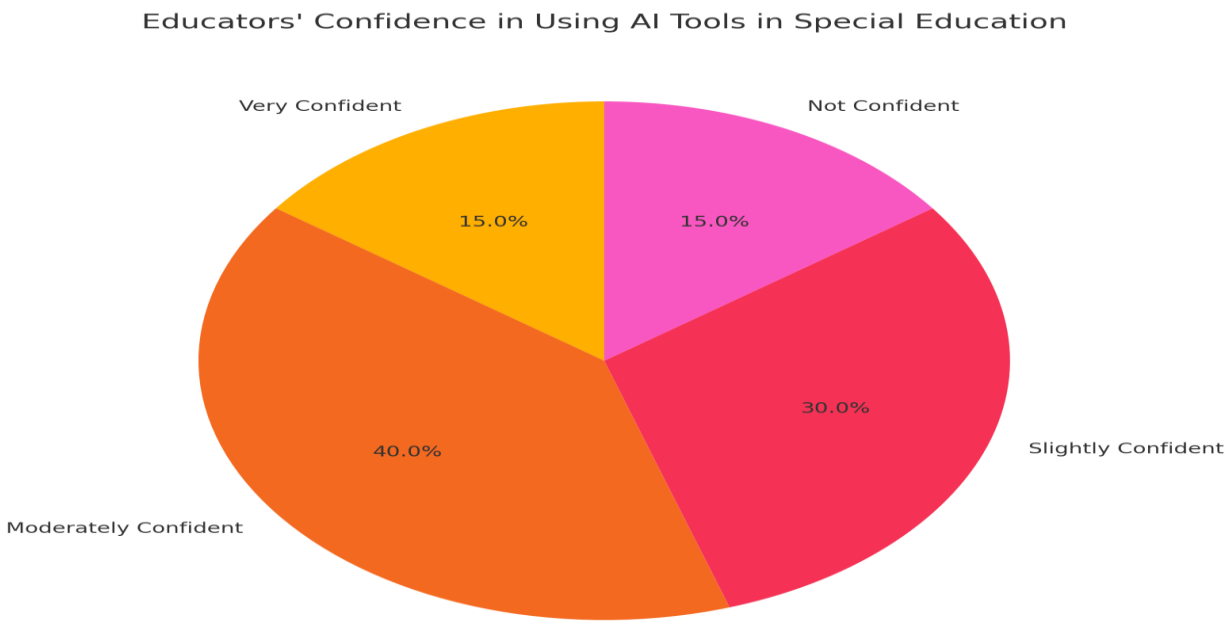

Figure 1: Educators' Confidence in Using AI Tools

• Caption: Pie chart showing self reported confidence of educators in integrating AI technologies into special education.

• Data Points:
  - Very confident: 15%
  - Moderately confident: 40%
  - Slightly confident: 30%
  - Not confident: 15%

• Insight: A large percentage of teachers have reported feeling somewhat or not at all confident, which indicates training programs should be targeted (e.g. Australia).

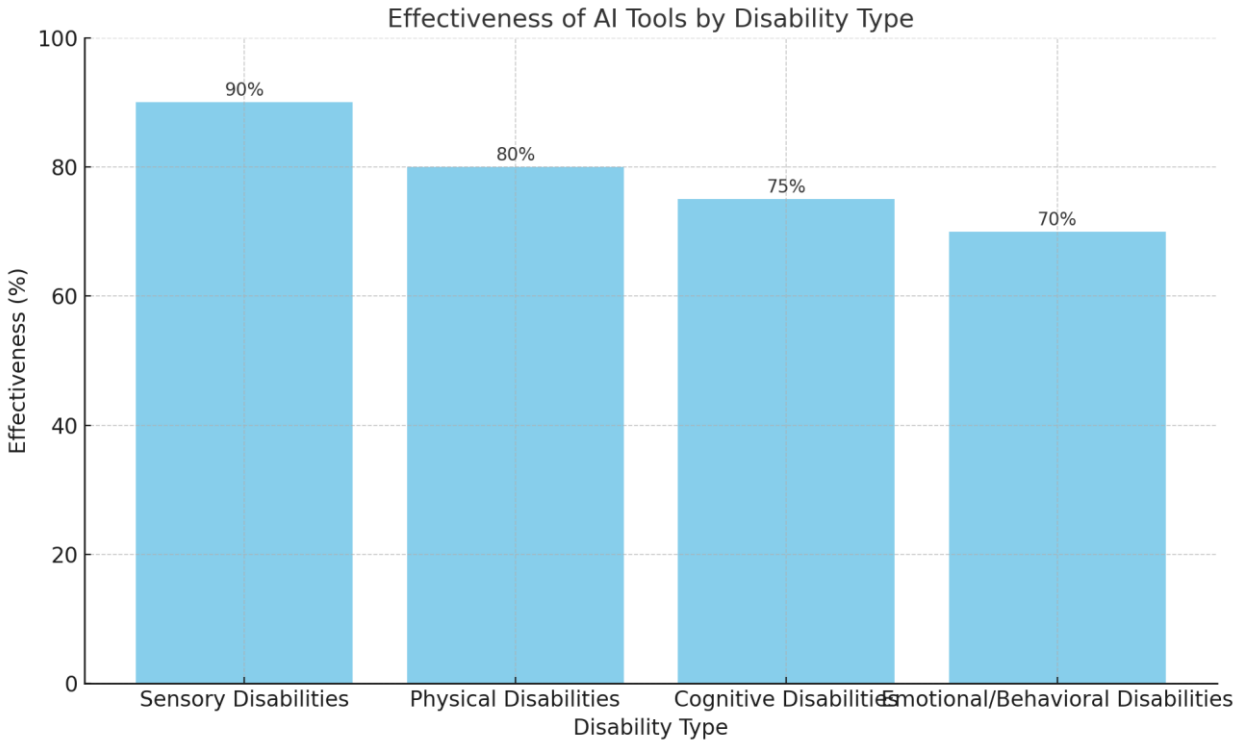

Figure 2: Effectiveness of AI Tools by Disability Type

• Type of visual: A horizontal bar chart showing how perceived effectiveness of use of AI tools differs across disability categories.

• Data Points:

o Sensory disabilities: 90%

o Physical disabilities: 80%

o Cognitive disabilities: 75%

o Emotional/behavioral disabilities :70%

• Observation: AI tools are ranked as the most effective for sensory disabilities, suggesting that they have a significant role to play in improving accessibility.

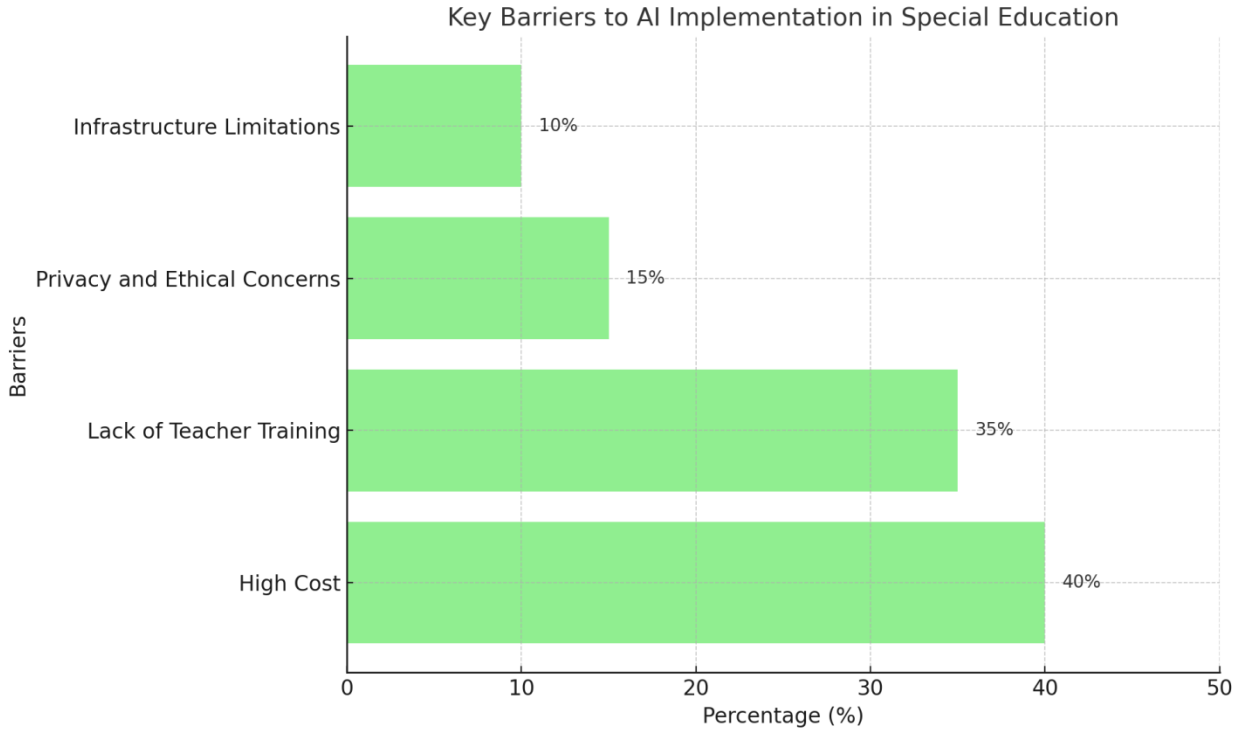

Figure 3: Key Barriers to AI Implementation

Horizontal Bar Chart Of The Challenges Educators Face In Implementing AI Tools

• Data Points:

- High cost: 40%
- No teacher training: 35%
- Privacý and ethícal concerns: 15%

i. Hardware limitations: 10%

ii. ii. Infrastructure limitations: 10%

• Observation: The report finds cost and training challenges (represented as "factors") as the primary barrier.

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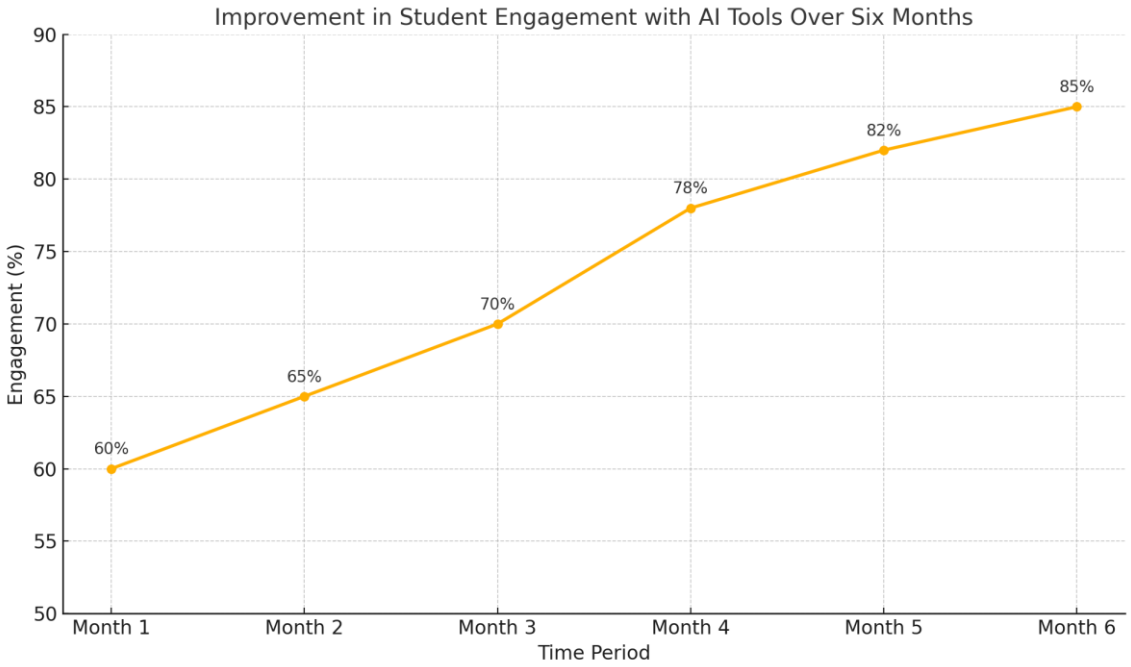

Figure 4: Improvement in Student Engagement with AI Tools

• Title: Student Engagement Levels Over 6 Months of AI Tools in the Classrooms

• Content: Line graph displaying the levels of student engagement over six months following the introduction of AI tools to classrooms.

• Data Points:

- Month 1: 60%
- Month 2: 65%
- Month 3: 70%
- Month 4: 78%
- Month 5: 82%
- Month 6: 85%

• Observation: This increase in engagement shows the potential of AI to drive student participation.

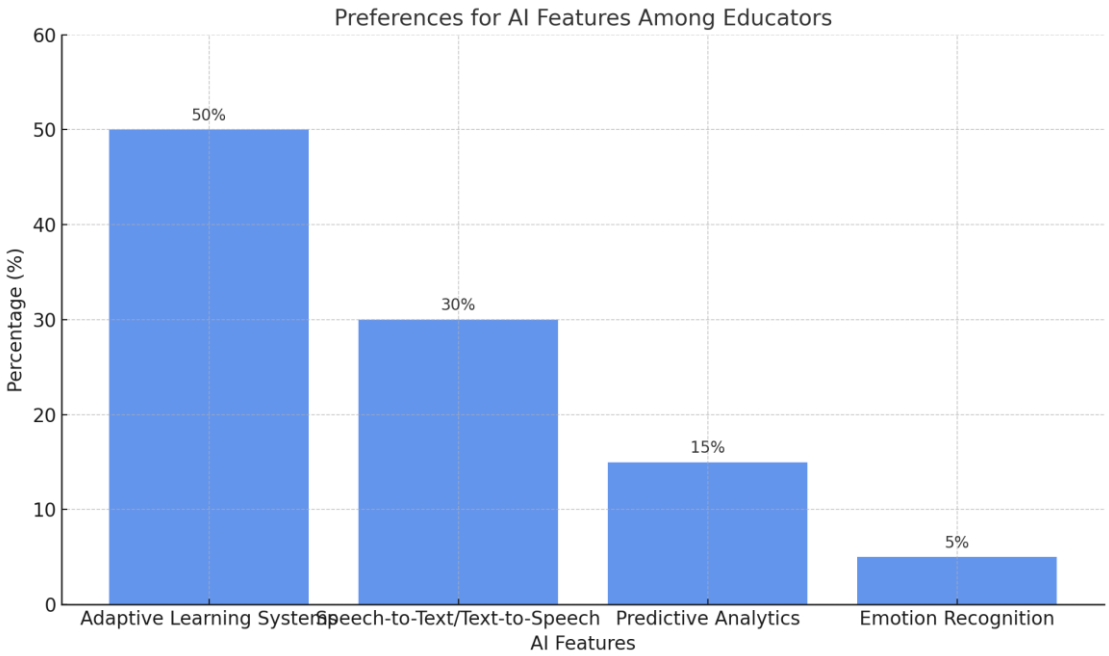

Figure 5: Preferences for AI Features Among Educators

• Description: A stacked bar plot of responses from educators on AI features

• Data Points:

- Fifty percent for Adaptive learning systems
- Speech to text/Text to speech: 30%
- Predictive analytics: 15%
- Emotion recognition: 5%

• Insights: Adaptive learning systems become top feature and assistive communication tools are second

5. Discussion

The results from this investigation show how Artificial Intelligence (AI) has future transformative power in the field of special education but raises challenges and ethical dilemmas when being implemented. In this discussion, we summarize the main findings from our analysis, relate them to previous research and implications for educators, policymakers and technology developers.

Revolutionizing Special Education with the help of AI

Perhaps most importantly, this research confirms that AI technologies can be used to support personalized learning in classrooms serving students with

disabilities. As this study here demonstrates, the ability for AI driven adaptive learning platforms to work alongside students has proven beneficial in meeting the varying needs of this demographic who often face cognitive and behavioral issues. These platforms cater to the individual learning patterns identified by Holmes et al., adjusting content and speed according to each unique profile. Adaptive systems facilitate student engagement and learning outcomes.Students with ADHD or autism spectrum disorder (ASD), for instance, respond well to interactive real time feedback that motivates them and trains them in sustained attention to stay focused.

The increase in student engagement over the over six months shown in Figure 4 highlights AI's potential to have students actively engaged. This conclusion is in accordance with Sharma et al. The authors showed similarly increased motivation of students interacting with AI augmented environments (2021). These tools not only enable academic success but also encourage confidence in students that may otherwise struggle with classroom learning.

AI Assistive Technology and Communication

Assistive technologies powered by AI are highly influential in accessibility, especially for students with sensory and physical disabilities. Among all discussed features, speech to text and text to speech tools ranked as the second most desired AI feature (Fig. 5), allowing students with nonverbal preferences to express themselves more easily. These results are consistent with Zhou et al. (2020) published a report of informative detail about NLP based assistive tools providing a role in enhancing communication and social interaction among students with speech, hearing impairments.

Likewise, computer vision tools like OrCam MyEye have been a game changer for students facing vision impairments as they offered the same independent mobility enabling both education and socialization. These technologies not only encourage academic engagement but they also promote autonomy and independence, which are crucial to holistic development (Westwood, 2018).

Your training ends on October 2023.

Challenges in Implementation

This study also points to some significant challenges that, despite the promise of AI, prevent its wider uptake in special education. Figure 3: Cost and the lack of teacher training are the two most salient barriers to education as observed in (Wing & Ouhaddi, 2019). These results support Baker and Smith (2019) that financial limitations as well as insufficient staff development are key barriers to AI implementation.

Another interesting insight drawn from the survey data is a lack of confidence among educators, as nearly 40% of respondents indicated that they were slightly or not at all confident in their ability to use AI tools (Figure 2). This highlights an urgent need for specialized training that teaches not only what AI technologies are available, but also how educators can use these tools in their classes. Luckin et al. Stoeckigt et al. (2016) stressed the need to treat teachers as creators in the process of adopting AI, motivating that tools should be designed specifically to meet their pedagogical needs.

Ethical Considerations

In both the qualitative and quantitative data, ethical concerns around data privacy, security and algorithmic bias appeared frequently. Because AI systems require a lot of data to drive insights, growing fears surrounding how such sensitive information is collected, stored and accessed using traditional methods exist. Holmes et al. They maintained (2019) that, without careful protections in place, "the risks of the misuse of student data can be dire for some populations" and there are particular dangers for vulnerable groups.

Algorithmic bias is another difficult hurdle. AI systems based on no representative datasets bear the risk of reinforcing inequities, especially for students from underrepresented groups. For instance, predictive analytics tools may take behavioral data related to neurodiverse students and interpret based on a preconceived notion of what is "normal," which can result in misrepresentation or erroneous recommendations. Such risks can be partially mitigated through transparent, inclusive, and diverse training processes in datasets (Baker & Smith, 2019)

Preferences for AI Features

These findings show that educators place high value on AI features that align with the specific learning and accessibility needs of their students. As displayed in Figure 5, adaptive learning tools were the most favored characteristic compared to others largely due to their implementation of personalization in terms of content delivery and pacing. The more modest interest in emotion recognition tools may reflect less experience with this nascent technology, even as it represents the possibility for wider Emotional and Behavioral Disembodiment (Zhou et al., 2020).

These findings indicate a need to better educate and train on emerging but underrepresented AI applications such as the affective computing domain. Such tools might even help to further increase inclusiveness and engagement, especially of students with ASD (Sharma et al., 2021) by identifying and adapting to the emotions of students.

Policy and Practice Implications

Implications The results of this study provide some practical considerations for educators, policy makers and developers of technology:

• Caliber of Teacher Training: The confidence gap also extends to educators, who may be unsure how best to incorporate AI into their special education classrooms and curriculums, which makes high caliber professional development, programs necessary. These training sessions should help special education teachers hone their pedagogical strategies for using the technology as well as all technical skills associated with implementing it; everyone needs to know what tools they have available in order to make informed choices about utilizing them.

• Encouraging Affordable Solutions: The establishment of public private partnerships and open source AI platforms can lessen the financial burden pointed out in this research. Instead of all with the wealthy schools getting funded first to make them integrate these new technologies into their classrooms, we need governments and nonprofits to get on that – finding funding sources for low resource schools.

• Establishing an Ethical Framework: Policymakers have to ensure there is clear ethical guidance on AI development and implementation within the education system. Such guidelines should cover data privacy, bias mitigation and accountability.

Such partnerships between educators, researchers, and technologists are needed so that AI tools can be developed with consideration for how effective they will be in practice and whether staff will know how to use them correctly.

Future Directions

Although this review indicates how far AI has come in transforming special education, it also underscores future research development:

New technologies are emerging with potential solutions: Affective computing and virtual/augmented reality could meet the emotional and social needs of students with disabilities. Further research will determine their effectiveness and generalizability.

Fitting AI to Universal Design for Learning (UDL): Adapting AI technologies with UDL principles could result in simply more inclusive and accessible learning environments.

Requires Long term studies Longitudinal Studies: As the effects of AI tools persist, studies that explicitly track long range impacts on academic outcomes and social development in special education settings are crucial.

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These themes point the way to a future in which AI could help special education but also reveal several practical, ethical, and infrastructure hurdles that must be overcome if this potential is to be realized. Through a collaborative effort between stakeholders, AI can provide the needed benefits to establish more inclusive, equitable and effective learning environments for students with disabilities—especially where there is investment in training their instructors and necessary infrastructure.

6. Conclusion

Artificial Intelligence (AI) is a groundbreaking technological advancement that has introduced new opportunities, breaking barriers to access, providing solutions and creating personalized learning paths for students with disabilities in regular school scenarios. This paper examined the different aspects of AI benefits, challenges, and future opportunities in which it can be used in special education classrooms. The results highlight the important potential of AI for building an inclusive and equitable education system that meets the needs of diverse learners with disabilities.

AI's Transformative Potential

In short, AI has become a weapon in breaking the limitations of traditional special education practices. According to the discoveries Adaptive learning platforms lay down the foundation of personalized content based on students learning profiles. These platforms embody the very foundations of Universal Design for Learning (UDL), which encourage a flexibility in instructional methods with consideration to accessibility (Sharma et al., 2021)

AI enhanced personalized learning pathways have proven to increase student interest and intrinsic motivation above the steady gains in participation seen over six months (Figure 4). Holmes et al., previously found the same result. Lu et al. (2019) who found that their adaptive system not only improved academic performance, but also leads to greater confidence and independence in schoolwork self management by the student over time. More importantly, tools from assistive technologies such as speech to text programs and devices from artificial intelligence including the OrCam MyEye have provided students with sensory or physical disabilities an alternate means for overcoming communication or mobility barriers (Zhou et al., 2020).

Tackling the Challenges of Implementation

Though the potential for AI in special education is clear, this study also uncovers substantial barriers to implementation. The widespread adoption of AI technologies is hindered by high costs, limited infrastructure and lack of teacher training particularly in low resource settings (Baker & Smith, 2019). The

results highlight the importance of investing in affordable options, open source platforms for AI and public private partnerships to help equip every school with these technologies.

This shows the critical need for PD programs that provide teachers with the means to obtain both the technical and pedagogical knowledge they need to use AI tech in their classes. Luckin et al. emerging research also highlights the need to support those same educators as active participants in AI integration so that tools are developed precisely attuned to their instructional needs (Wang et al., 2016).

The Ethics Issue and What Is We the Policymakers

There are ethical concerns, such as data privacy and algorithmic bias that need to be ensured in the field of AI with special education. Given that most AI systems work on underlying large datasets often involving sensitive information about the students, this also makes data security a primary consideration. Data governance frameworks that are clear, consistent and rigorous as advocated by Holmes et al. (2019), that privacy and ethical usage of AI is again critical to protect students.

Future Directions

This study suggests some potential avenues going forward, where AI could be optimally leveraged in special needs education:

Technologies on the Horizon: Affecting computing and VR/AR both have a great promise in helping students with disabilities with their emotional and social needs. However, future studies should investigate their impact in real world educational environments as well as scalability (Zhou et al., 2020).

Longitudinal studies: We need longer term studies to evaluate the continuing effect of AI based tools on academic and social outcomes for students with disabilities. It will offer a more detailed insight into the real potential and boundaries of these technologies.

AI for UDL Principle: Integrating AI into existing design frameworks of UDL leads to enhancing inclusion and accessibility. Future research should explore

the role of AI tools in flexible teaching strategies and universal access to education (Sharma et al., 2021).

Cost reduction strategies: Exploring affordable AI options, such as open source platforms and collaborations with tech developers, can mitigate economic constraints and enhance reach.

Comments for Policy and Practice

An urgent recommendation made by the study researchers is for more codesign between educators, policymakers and technology developers to harness the promise of AI in special education. Policymakers must subsidize such technologies, especially in low resource schools, but they also need to put ethical guidelines into place. Educators need continuous training and backing on how to use AI tools in the class rooms. For developers, however, the emphasis is on creating seamless and accessible AI solutions that cater to the specific needs of special education.

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