AI AND SPECIAL EDUCATION: INCLUSIVE PRACTICE AND SUPPORT

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Abstract

Artificial intelligence (AI) technology has refashioned computer tools, allowing them to do a variety of jobs while simulating human intelligence and problem-solving abilities. AI has emerged as a major concern for inclusive classroom practices and supports.Innovative educational technology has begun to offer up new communication channels for pupils with special needs which enhance the quality of Special Education. Therefore, there is a need to apply artificial intelligence technology to increase learning and liven up daily life particularly for children with disabilities. This chapter examines the concepts, significance, AI tools for special education and examines the role of AI in promoting Inclusive practices and supports.

Key Words: Artificial Intelligence, Special Education, AI tools, inclusive practices.

INTRODUCTION

Artificial intelligence (AI) has become a transformative force in numerous domains, and its impact on education, particularly in special education, is profound .The term AI was first describe as the discipline and practice focused on creating intelligent systems, particularly intelligent computer programs, through scientific and engineering endeavours (Carthy,1956).Artificial intelligence (AI) is define as, a system exhibiting intelligent behavior by analyzing its surroundings and autonomously taking actions to accomplish certain goals (HLEG,2019). Artificial intelligence (AI) is a field within computer science that explores the replication and potential enhancement of human-like intelligent behaviour in computers Naqvi(2020). According to Stuart & Peter (2003) Artificial intelligence (A.I.) is commonly defined as the exploration and progress of intelligent agents capable of perceiving their surroundings and making decisions to increase their chances of attaining objectives.Artificial intelligence involves machines, especially computer systems, replicating human intelligence processes. These processes encompass learning, where the system acquires knowledge and principles for its application; reasoning, where rules are utilized to draw conclusions; and self-correction. AI aims to imbue robots with intelligence, whereas intelligence itself is the characteristic enabling an organism to function adeptly and with foresight in its surroundings(Wang et al., 2015).Special education, on the other hand, focuses on providing tailored instruction and support to students with disabilities or exceptional learning needs .Bob (1990)Special education entails more than just teaching students. It ensures that students have access to a broad range of resources and opportunities to support their success in life'.

The intersection of AI and special education represents a burgeoning field that seeks to leverage technological advancements to enhance learning outcomes for diverse learners. As the demand for inclusive practices and individualized support continues to grow, Artificial intelligence (AI) has emerges as a dynamic force impacting many aspects of human behaviour and as evidenced by numerous and significant research contributions AI has contributed significantly as in overcoming various obstacles that are faced in special education. As the benefits of artificial intelligence (AI) in education have been widely acknowledged, over the past decade, a specialized branch of the Artificial Intelligence in Education research community has concentrated on the integration of AI and Special Education(Wu et al., 2006).Special education

is based on a commitment to equity, inclusivity, and individualized support for each learner and thus, AI is much needed to improve existing methodologies and interventions to equip learners with their special needs because despite ongoing attempts to create equitable educational environments, inequities persist which calls for innovative methods. According to UNESCO (2009)There are endeavours underway to promote the adoption of inclusive education and establish inclusive settings where every child, regardless of disability, cultural heritage, or economic status, can learn together . Bryant et al., 2019 suggest that while inclusive education encompasses various educational methods, special education (SE) strategies can be employed to address and support the unique learning requirements of students with special needs within the classroom setting.

This chapter initiates a systematic study into the involvement of AI in special education, referencing the foundational studies of researchers who have made substantial advancements in this area.For instance, studies such as Porayska et al. (2018) explored ECHOES, an artificial intelligence system, with the goal of improving autistic children's social interaction skills. This strategy is mostly for working with autistic children aged 4 to 14. It was discovered that ASC youngsters had improved significantly in their social responses to human practitioners. Similarly, Srihari et al., (2008) developed a method powered by artificial intelligence to automatically grade short handwritten essays in reading comprehension tests, showcasing AI's potential in assessing student proficiency. Concurrently, the chapter navigates the intricate terrain of AI, elucidating its underlying principles, capabilities, and limitations. By demystifying AI technologies which are applicable for children with special needs. This chapter explains how various technologies can be used to serve learners with special needs. From personalized learning algorithms to assistive devices and discuss how AI can transform the educational landscape by offering tailored interventions that adjust according to the unique profiles of individual learners.

OBJECTIVES:

- To discuss the significance of AI application in special education.
- To discuss various AI tools for learning disabilities.
- To discuss various AI tools for Attention Deficit Hyperactivity Disorder (ADHD)
- To discuss various AI tools for Autism.

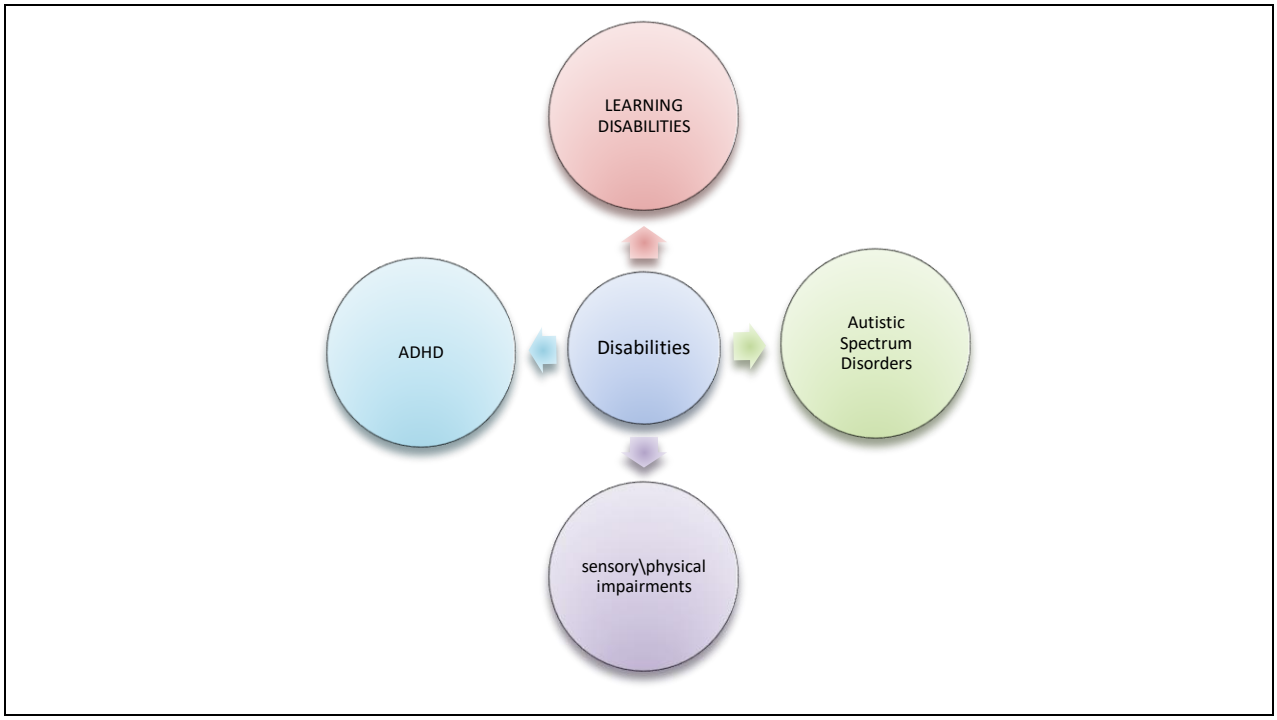
- To discuss various AI tools for sensory and physical impairments.
- To critically examine the role of AI in promoting Inclusive practices and supports.

IMPORTANCE OF AI IN SPECIAL EDUCATION

AI plays an important role in special education by personalizing learning experiences, offering assistive technology for accessibility, and enabling early intervention through data analytics and thus, enhance inclusivity and optimize learning results for students with special needs .As technology advances, computing power pervaded an increasing number of facets of modern life. There is an increasing endeavor to make technology in the classroom more accessible. Extensive study into the use of AI in education is being undertaken, with the goal of building educational settings that improve the process of learning across numerous contexts (Nanni & Lumini, 2009). Individual having various kinds of disabilities often faced difficulties in many aspects of their lives. AI has the ability to benefit millions of people with disabilities and person without disabilities. According to Shi, et al., (2022) assistive technology can aid children with disabilities live healthier, more productive, and more engaged lives, hence reducing disparities. Assistive technology refers to the gadgets, software, and tools that help persons with impairments complete tasks. It ranges from basic help like adapted utensils to complex electronic devices like screen readers. Its goal is to increase independence and quality of life by meeting individual needs in areas such as mobility, communication, and daily living activities. Wheel chairs, hearing aids, and communication devices are among the examples. Continuous technological advancements drive innovation, making assistive technology vital in promoting accessibility and inclusion in a wide range of sectors of life. Assistive technology is a broad term that includes walkers, wheelchairs, hardware, software, and any other sort of equipment that helps and simplifies the lives of people with disabilities. These technologies enable disabled people to live independent lives and participate in society (World Health Organization, 2012). Microsoft has been able to empower persons with disabilities through technical developments, such as offering learning tools that have helped dyslexic children study more effectively. Application of A.I. in special education is viewed as a way to improve the quality of Individual with special needs. Therefore, there is a need to introduce artificial intelligence approaches in order to construct both diagnostic and intervention processes.(Drigas & Ioannidou, 2012).The right integration of AI technology has the potential to enhance learning outcomes for a wide spectrum of individuals.

Researchers have created AI technology capable of executing intricate calculations through electronic devices, streamlining human existence. The latest progress in artificial intelligence holds promise for revolutionizing educational prospects, especially for individuals with disabilities. Extensive research is currently underway to integrate AI into educational settings, aiming to establish learning environments that enhance the learning experience across diverse contexts (Nanni & Lumini, 2009). Special education is concerned with teaching kids who require special learning accommodations due to physical, mental, emotional, or behavioral difficulties. These people often need unique educational programs to satisfy their specific learning needs and traditional classroom settings and educational methods may not always be adequate to meet these evolving needs. AI applications in special education can help to address these difficulties. AI-powered tools and technology can tailor learning experiences, promote skill development, and increase accessibility for students with special educational needs. For example, AI can assist in the development of Intelligent Tutoring Systems that adjust to student's learning pace and style. According to Margetts & Dorobantu (2019), Artificial intelligence can utilize learners' behavioural data to provide personalized and adaptive educational services tailored to their specific requirements .AI can also help with data collection and analysis, allowing teachers to evaluate student performance and devise effective teaching strategies. Chaudhary & Kazim (2021)'AI in Education' has the ability to drastically automate and track the learner's development in various skills, allowing a human teacher to assist where it is most needed. AI in education might potentially assist teachers discover the most effective teaching approaches depending on their students' situations and learning backgrounds as AI is capable of automating repetitive operating operations, creating exams, and automating grading and feedback.

AI TOOLS FOR VARIOUS TYPES OF DISABILITIES



AI TOOLS FOR LEARNING DISABILITIES

A learning disabilities is a neuro developmental condition that affects cognitive processes, this includes: Dyslexia (reading), dysgraphia (writing), dysphasia (language), dyscalculia (mathematics), dyspraxia (motor skills), auditory processing disorder (Difficulty hearing differences between sounds , the inability to hear clearly or the inability to discern minor distinctions in sound which makes it difficult to sound out words and grasp the fundamentals of reading and writing),Visual Processing Disorder (Difficulty interpreting visual information, Visual perception issues include missing tiny shape distinctions, reversing letters or numbers, skipping words or lines, misinterpreting depth or distance, and having difficulties with eye-hand coordination)Kemp et al.,(2024) . The global population with learning disabilities has reached 79.2 million and is steadily expanding (UNICEF, 2021). According to Ouherrou et al., (2019), learning difficulties affect not only academic performance, but also emotional and social qualities. Research suggests that children with learning impairments (SWLDs) are more prone to experience negative emotions, such as despair and loneliness, than their peers without disabilities.As a result, aiding SWLDs in satisfying academic demands will help them develop

socially and emotionally. Supporting SWLDs in the classroom can be difficult because each student's learning situation differs. As a result, teachers require advanced technologies, such as Artificial Intelligence (AI) apps, to help them identify students' particular needs and strategies for meeting them (Panjwani & Zhai, 2023). As technology improves, more students throughout the world are becoming accustomed to using chat robots or smart assistants on digital platforms connected to their lives. Large corporations have used chat robots' AI technology to provide customer support and debug their products, resulting in the application in education. A study used a chatbot to help SWLDs. One hired a smart assistant, Sammy, who interacted with students via chat to provide accessibility, resources, or remarks based on their needs (Gupta & Chen, 2022).Another study by Rajapakse et al. (2018) deployed a smart phone app known as ALEXZA to assist individuals with dyslexia by reading aloud, chunking, highlighting, and modifying the text in various ways. The study's findings demonstrate that, while many applications exist to aid people with dyslexia, most focus on detecting dyslexia and offering long-term solutions rather than the immediate day-to-day support that these individuals require. Consequently, they developed ALEXZA, an application utilizing artificial intelligence to customize learning content based on the preferences of dyslexic users. While text manipulation, such as altering the text format or reading it aloud, might seem like a simple substitute for printed text, for students with learning disabilities, particularly language-based ones like dyslexia, these features assist in learning. The characteristics of the ALEXZA application enable learners with reading difficulties to access previously challenging materials, the app's smart assistant might potentially answer directly to user questions. Both studies utilized a chat assistant powered by AI technology to provide accessibility assistance to students with reading-based learning disabilities.Wang et al., (2021) Added artificial intelligence to an Augmentative and Alternative Communication (AAC) device to improve students' spoken communication (Latif et al. 2015)The learning process for writing was implemented using machine learning, and learners were given the option to practice comparable abilities until they obtained mastery before progressing to the next learning segment.Srihari et al., (2008) Created two computational algorithms for autonomously grading brief handwritten essays in reading comprehension examinations, which aim is to award a score to each handwritten response that corresponds to human scorers' assessments. This method of measuring reading comprehension gives kids immediate feedback while also providing useful insights for educational researchers, parents, and teachers. The research outlines two approaches:

One method employs latent semantic analysis (LSA), necessitating a particular accuracy level in handwriting recognition, while another utilizes an artificial neural network (ANN) trained with data from handwriting images. Both approaches underwent training and evaluation using a collection of essays written in response to state wide reading comprehension questions, graded by humans. Despite encountering some issues with word recognition in testing, the system's scoring performance shows promising results.

Additionally, Jain et al., (2009) developed the Perception-based Learning Disability Detector (PLEDDOR).) , PLEDDOR is an acronym representing a neural network model created to identify difficulties in reading (dyslexia), writing (dysgraphia), and mathematics (dyscalculia) by analyzing curriculum-based assessments administered by trained educators. This computational evaluation system includes a sole input layer, eleven units corresponding to different sections of a standard exam, and a solitary output unit. Its efficiency was assessed using a group of 240 children from schools and hospitals in India, demonstrating its ease of use and replicability on a large scale. It produced consistent results comparable to established detection methods. Voula et al., (2003) created a fuzzy cognitive mapping method aimed at diagnosing specific language impairments (SLI). Fuzzy cognitive maps represent a computer model that combines qualitative and quantitative aspects, incorporating the expertise and insights of specialists. This model was constructed using information from existing literature and subsequently validated through testing on four clinical cases, yielding promising results. The findings suggest potential integration of the model in future diagnostic practices, highlighting its value as a differential diagnosis tool for SLI. The outcomes demonstrated encouraging progress. Melis and Colleagues (2001) Presented Active Math which represents a versatile web-based educational platform that dynamically generates interactive courses in mathematics, tailored to individual students' objectives, preferences, capabilities, and existing knowledge. It functions as an Intelligent Tutoring System (ITS), enabling students to engage with learning materials at their own pace and convenience. Incorporating various Artificial Intelligence technologies, it supports adaptive curriculum development, student profiling, feedback mechanisms, interactive exercises, and employs a specialized knowledge representation suitable for the semantic web. Within the Active Math environment, users create personalized student profiles by assessing their understanding of concepts and defining their learning goals and preferences. For example, when preparing for an

examination, the system considers the student's proficiency levels in both course generation and recommendation processes.

Below are some of the tools designed to meet special needs:

TOOLS	FEATURES
Proloquo2Go	Proloquo2Go by Assistive Ware is a comprehensive communication solution for persons who have trouble speaking. It adds natural-sounding text-to-speech voices, nearly 20,000 up-to-date symbols, sophisticated automatic conjugations, a big default vocabulary, complete expandability, and great ease of use to the iPod Touch, iPad, or iPhone (**Boundless Assistive Technology, 2024**).Proloquo2Go is a communication system that provides a natural, understandable voice to people who are nonverbal or have speech, language, or hearing difficulties that make clear communication difficult or impossible. Assistive Ware's symbol-based AAC (Augmentative and Alternative Communication)solution allows users of all ages, including those who cannot read or write, to communicate via visual symbols on their iOS devices (Cali, 2021).This tool is for people with difficulty in communication, It assist people with speech or language problems.Proloquo2Go also includes word prediction, message history, and voice output. Proloquo2Go for iPad improves academic occupational performance by offering voice output and a variety of answer possibilities. (Debra et al., 2018).
Read &Write:	Read&Write is a literacy aid that offers support for everyday activities, benefiting a wide range of students, including English language learners, special education students, and high-achieving individuals. Its versatility lies in the ability for students to select from a range of tools that suit their needs and preferences, empowering them to choose what works best for them and when they need it. For students facing challenges in reading comprehension, such as those with dyslexia, Read

	&Write provides various tools to assist them. For instance, if a student struggles to grasp the meaning of a word, they can easily utilize the Text & Picture Dictionary feature to obtain definitions and view accompanying images. (Texthelp Ltd, 2024).
Co:Writer Universal:	Co:Writer Universal is especially useful for children who struggle with specific writing skills, such as word choice and spelling. While writing, pupils will receive auto-generated lists of potential words to assist them overcome mechanical blockages and articulate their ideas. It may also help children find and learn new words.In addition to word prediction and spelling check, students can utilize the read-out tool to highlight sentences or full parts of text and hear them read aloud.(Sandy, 2020)This tool will be of great benefit for students with such as dyslexia or dysgraphia.
Mathway:	Mathway is a tool for problem-solving in math,specifically designed for individuals grappling with mathematics or needing additional support in the subject. Regarded as the premier math calculator globally, Mathway covers a wide array of mathematical areas including algebra, graphing, and calculus. Offering unrestricted access to math solutions, Mathway aids students facing difficulties in math by furnishing step-by-step solutions and instantaneous explanations, thereby enhancing comprehension. As per research findings, engaging with the Mathway program enhances students' confidence and diminishes their anxiety towards mathematics, particularly in problem-solving scenarios. This contributes to a reduction in the fear of making errors and fosters a deeper sense of meaningful learning.(Ghanem &Yahya, 2022).
	It is a note-taking tool, which can be beneficial for children who have attention deficit disorder or struggle to organize themselves. It can

Notability:	capture typed or handwritten notes, record sounds, Annotate and synchronize data between devices. Notability enables users to easily arrange and locate their notes, making review and learning easier.The advent of mobile devices has transformed the approach student's use to record notes. Initially, electronic note-taking involved simply typing notes into a laptop computer, but it has since evolved into a wide range of options.(Bennett & Danielle, 2018)
Snap &Read	It is a tool to assist those who struggle with reading; it is a text-to-speech program that is especially useful for people with dyslexia and visual impairment. Snap & Read has the ability to audibly read text from various digital platforms such as web pages, documents, and ebooks. Moreover, it offers features like text highlighting, translation, and customization of reading preferences. Snap & Read functions as a Google Chrome Extension compatible with Chrome books, Mac and Windows desktops utilizing the Google Chrome Browser. Additionally, it is available as an iPad App, with an added functionality of camera OCR allowing users to capture text from a page and have it read aloud (Thompson, 2024).

AI TOOLS FOR AUTISTIC SPECTRUM DISORDERS (ASD)

ASD is a prevalent developmental disorder impacting a significant portion of population, characterized by a trio of distinct features. Individuals with autism exhibit particular interests and behaviours, encountering challenges in social interaction and language comprehension (Rapin and Tuchman, 2008).Children with autism spectrum disorders may struggle to communicate, read body language, learn fundamental skills, form friendships, and maintain eye contact (Kemp et al., 2024).Sebe and colleagues (2006) developed a digital system for identifying emotions that incorporates both visual and auditory cues. This tool for human-computer interaction not only recognizes the six fundamental emotions (joy, surprise, anger, contempt, fear, and sadness) but also detects other emotional states such as curiosity, apathy, perplexity, and restlessness.Its utility extends to children, particularly those with speech issues, and those with Autism Spectrum

Disorder (ASD), who typically struggle to read the emotions of others. This method evaluates 11 emotional states in 38 persons by combining visual and aural data using Bayesian Networks. Furthermore, it incorporates a variable into the Bayesian Network to assess whether the user is speaking. After calibration, the system identifies head movements and local face feature deformations, such as brows, eyelids, and lips, and representations these motions with specified magnitudes of various facial characteristics. Testing on 38 graduate and undergraduate students from various occupations revealed that using both visual and aural information in classification resulted in significantly increased emotion detection accuracy. Arthi & Tamilarasi (2008) Using Artificial Neural Networks (ANN), they created a model for diagnosing autism in children. The system transform the initial data related to autism into appropriate fuzzy membership scores, which are then inputted into the neural network structure. Additionally, a pseudo method is devised for identifying autism through the back propagation algorithm. This method is suggested for individuals outside the medical, psychological, and educational fields. In forthcoming studies, the k-nearest neighbour approach may be utilized to forecast autistic disorder for comparative analysis. According to Farhan and colleagues (2021), it has been proved that using NAO robots enhances both verbal and nonverbal communication in autistic children. This study included four children from the Welfare of Autistic Children (SWAC) in Dhaka, Bangladesh, and was carried out in four sessions. The first session focused on introducing the robot, while the second session elicited comments from the children. The NAO robot asked the young people, "How old are you?" "How are you?" "What is your father's name?" "What is your name?" And last, "What is your mother's name?" The third session was dedicated to physical activities, such as dancing and exercising, while the fourth session was to gather feedback from sessions two and three. After four weeks, the first child's total performance improved by 45%, the second by 70%, the third by 30%, and the fourth by 75%.

AI TOOLS FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

Attention Deficit Hyperactivity Disorder (ADHD) is classified as a Disruptive Behavior Disorder characterized by enduring and impairing behavior patterns characterized by unusual levels of inattention, hyperactivity, or both (Anuradha et al., 2010).

ADHD is a condition marked by challenges in learning, stemming from factors of unclear origin or circumstances. This mysterious factor hampers the brain’s capacity to effectively receive and

process information (Eickaet al., 2008). Children with ADHD often struggle with remaining seated, maintaining focus, adhering to instructions, staying organized and completing academic tasks (Kemp et al., 2024). According to Anuradha and colleagues (2010), the typical traits associated with ADHD include symptoms of hyperactivity, impulsivity, and inattention. These manifest as challenges such as difficulty remaining seated, constant fidgeting and bouncing while seated, excessive talking, displaying constant movement, climbing on or jumping off objects, and behaving inappropriately. Other indicators include running without proper caution, struggling to wait for turns, interrupting others' activities and conversations, blurting out answers to unaddressed questions, and acting recklessly without consideration for consequences. Anuradha and colleagues (2010), developed a platform aimed at enhancing the precision and efficiency of diagnosing Attention Deficit Hyperactivity Disorder (ADHD), pioneering the application of Support Vector Machines (SVMs), a renowned artificial intelligence method, for this purpose. SVMs, comprising supervised learning techniques adaptable to classification and regression tasks, were employed to analyze a dataset endorsed by medical experts, containing questionnaire outcomes crucial for diagnosis. The SVM module meticulously processed the dataset, producing a diagnostic outcome. A pivotal advantage of leveraging the SVM algorithm lies in its adeptness at handling the intricacies inherent in the diagnostic process.The method was tested on children aged six to eleven and had an 88.674% success rate in diagnosis. Integrating a chatbot into a serious game designed to enhance young individuals' social skills and teamwork can enhance learning outcomes by involving students in interactive and immersive experiences that facilitate skill development. The game effectively fostered the advancement of social skills and teamwork, with the chatbot playing a crucial role in this success (Mansilla et al., 2017).Individuals lacking access to conventional therapy or counselling might find emotional assistance through chatbots like Xiaoice beneficial. Xiaoice was created by integrating cognitive psychology, machine learning, and natural language processing methods (Zhou et al., 2020).People with social difficulties, such as ADHD, may benefit from chatbots like XiaoIce. Chatbots like XiaoIce can provide emotional support to persons who struggle with traditional social interactions. A smart phone application for parents of ADHD children has been developed, and its utility has been proved through a study that included the production of a prototype with feedback from both parents and clinicians.The aim is to evaluate whether the software can aid parents in managing their children's ADHD symptoms and determine its practicality and

usefulness in this regard. The software has garnered positive feedback from parents and demonstrates promise as a tool for managing ADHD symptoms in children. However, the authors emphasize the importance of software enhancements to enhance its effectiveness and usefulness further (Păsărelu et al., 2023).

AI TOOLS FOR PHYSICAL IMPAIRMENT:

According to Collins dictionary "*A physical impairment is a condition in which a part of a person's body is damaged or is not working properly*". Dr. Burdet's team at Imperial College developed a motorized wheelchair incorporating a shared control system. Such systems typically offer various modes that adjust the level of assistance provided to the user and the algorithms governing movement. The computer autonomously guides the wheelchair along predetermined routes, while the user remains vigilant for unexpected obstacles. A slower Brain-Computer Interface (BCI) is used for switching between destinations, with a "fast" one utilized for emergency stops. This method reduces the cognitive load associated with navigation, mitigating fatigue, and requires minimal training. However, its usage is confined to known locations and programmed destinations (Rebsamen et al., 2010). Students with long-term or complicated physical disabilities require educational support to maintain their independence and overall well-being, supporting a fulfilling life to the best extent feasible. Medical practitioners typically evaluate physical and sensory problems in children during their early years. As a result, AI applications prioritize educating pupils over diagnosing their needs, with an emphasis on parents and educators. Microsoft Translator has been released as an AI helpful tool for deaf pupils.This device includes a headset worn by the speaker that translates voice signals into captions visible to students with hearing impairments. The translator offers translations in 60 languages, making it easier for deaf students to understand (Roach, 2018). In 2008 Drigas et al., introduced the 'Dedalos' with the goal of providing English language education to individuals with hearing impairments who primarily use Greek sign language. Assessments and reviews of online learners' language skills are integrated into the development of educational materials customized to each user. This system utilizes an intelligent taxonomy system for student assessment and resource generation. Through this method, a comprehensive support system is established for the education of Greek children with hearing challenges, facilitating their inclusion in mainstream education.Chen et al., (1999) Created an infrared system that may be placed in spectacles. Three

quadriplegics with spinal cord injuries typed a 97-letter text in 4.9 ± 2.0 minutes with an average accuracy of 94.6% using only head gestures. In a second study, Chen et al., (2004),an infrared (IR) device paired with a communication board was employed with six individuals experiencing tetraplegia and unable to verbally communicate. The average accuracy rate for their selections was found to be 89.7% with a margin of error of +/- 5.5%. All participants received only a brief 10-minute instructional session before the testing, yet their performance was deemed comparable to that of able-bodied individuals using the same tool.

Analytical Examination of the role of Artificial Intelligence in Promoting Inclusive Support and Practices

Inclusive education is about tailoring school design, classroom layouts, teaching materials, teaching techniques, and activities to accommodate all students, assuring equitable learning and engagement for all. To promote inclusive education, schools must understand each individual needs. Teachers must employ instructional practices that welcome every child without judgment or categorization, promoting a setting in which children feel safe and empowered to express themselves and engage in discussions with one another. Pedagogical practices should be designed to promote creativity. Achieving inclusive education requires organizational support, including the installation of inclusive infrastructures helped by AI and augmented technologies to respond to the demands of students with special needs (Garg & Sharma, 2020).According to numerous research reviews, the application of AI (Artificial Intelligence) tools in special education, particularly for aiding students with various types of disabilities, has made major contributions in improving learning outcomes and increasing inclusivity. Various studies on AI for children with special needs show that AI has the ability to address a wide range of learning demands across different types of disabilities. One important component of AI technologies in special education is its capacity to provide individualized and instant support to individual with disabilities. For example, programs like ALEXZA and Read &Write which provide features like text-to-speech, text highlighting, and customized formatting to meet the needs of people with dyslexia or visual processing impairments. AI has made major contributions to establishing inclusive supports by satisfying the requirements of those with disabilities.AI tools have overcome hurdles to inclusivity by satisfying the demands of people with unique needs.In addition, AI-powered diagnostic tools such as PLEDDOR have been shown to play an important

role in early identification and intervention for people with learning difficulties. AI solutions assist educators and healthcare providers in quickly diagnosing learning issues and implementing tailored treatments to aid impacted individuals,Research conducted by Anuradha et al. (2010) which focused on an AI-based diagnostic tool for Attention Deficit Hyperactivity Disorder (ADHD) demonstrated success in diagnosing ADHD. Furthermore, AI-enhanced communication empowers individuals with speech or hearing impairments and promotes inclusivity. In this study we have highlighted some of the most typical research over the previous decade that applies AI technologies for accurate diagnosis and rapid intervention action. As per the previous studies,AI applications are used to help children with special educational needs, and the integration of these technologies varies widely.

Despite the benefits AI brings to inclusive education, challenges remain. Issues like equitable access to AI technologies, especially in resource-constrained educational settings or for economically disadvantaged individuals, are significant concerns. Moreover, ethical considerations, including privacy issues and algorithmic biases, demand careful attention when implementing AI solutions in educational contexts. Hence, a holistic approach is crucial to address challenges and ensure ethical and equitable utilization of these technologies. Continuous research and collaboration among educators, technologists, and policymakers are essential to harness the full potential of AI while mitigating its limitations in promoting inclusivity in education.

CONCLUSION

The increasing prevalence of learning disabilities worldwide necessitates innovative solutions to provide inclusive support. Artificial Intelligence (AI) tools offer personalized learning experiences tailored to individuals' diverse needs and offer promising avenues for personalized learning experiences and support mechanisms tailored to the unique requirements of individuals with learning disabilities. The utilization of AI in education, particularly for students with special needs, holds significant potential in enhancing both academic outcomes and socio-emotional Artificial intelligence (AI) has the potential to address the challenges faced by children with special needs by providing customized solutions that are tailored to meet specific learning demands and thus promotes inclusivity and advance educational equity. Further investigation can be done to reveal useful insights into the potential benefits, such as increased academic

achievement, increased involvement, and greater skill development, all of which contribute to the overall success of these students.

REFERENCES

Amerada, J., Tasha, T., Ramachandran, V., Arulalan, K., &Tripathy, B.K. (2010). Diagnosis of ADHD using SVM algorithm. COMPUTE 2010 - The 3rd Annual ACM Bangalore Conference. 10.1145/1754288.1754317

Azure Microsoft. (2017). Equate, Microsoft cognitive services.

Bennett, J., &Danielle, M.(2018). The iPad: A Mobile Learning Device and Innovative Note-Taking Tool. IGI. DOI: 10.4018/978-1-5225-2706-0.ch013

Bryant, D. P., Bryant, B. R., & Smith, D. D. (2019). *Teaching students with special needs in inclusive classrooms*. Sage Publications.

Cali Susan .(2021). Proloquo2Go – Augmentative and Alternative Communication Making a Difference. Accessibility.com

Cano, A., & Leonard, J. D. (2019). Interpretable multiview early warning system adapted to underrepresented student populations. *IEEE Transactions on Learning Technologies*, *12*(2), 198–211.

Charani, P.S., &Zhai, X. (2023). AI for Students with Learning Disabilities: A Systematic Review. In X. Zhai& J. Krajcik (Eds.), Uses of Artificial Intelligence in STEM Education (pp. xx-xx). Oxford, UK: Oxford University Press.

Chaudhary M. A., &Kazim E. (2021).Artificial Intelligence in Education (AIEd): a high-level academic and industry note.PMCID: PMC8261391PMID: 34790953doi: 10.1007/s43681-021-00074-z

Chen, Y. L., Tang, F. T., Chang, W. H., Wong, M. K , Shih, Y. Y., &Kuo, T. S. (1999). The new design of an infrared-controlled human-computer interface for the disabled. IEEE Transactions on Rehabilitation Engineering, 7, 474-481

Collette, D., Brix, A., Brennan, P., DeRoma, N., & Muir, B. C. (2019). Proloquo2Go Enhances Classroom Performance in Children With Autism Spectrum Disorder. *OTJR : occupation, participation and health*, *39*(3), 143–150. https://doi.org/10.1177/1539449218799451

Drigas A., &Ioannidou R-E. (2012). Artificial Intelligence in Special Education: A Decade Review. International Journal of Engineering Education Vol. 28, No. 6, pp. 1366–1372, 2012

Drigas, A.S., Kouremenos, D.,&Vrettaros, J.(2008).Teaching of English to Hearing Impaired Individuals Whose Mother Language Is the Sign Language. In: Lytras, M.D., Damiani, E.,Tennyson, R.D. (eds.) WSKS . LNCS (LNAI), vol. 5288, pp. 263–270. Springer,

Drigas,A., &Ioannidou R,E. (2012). Artificial intelligence in special education: A decade review. International Journal of Engineering Education, vol. 28, no. 6, pp. 1366–1372.

Eicka, L.W., Chritopher L., Stewart H.M., Christine P., Jennifer C. G. L., Martha B. D., & E. Mark Mahone. (2008). "Prediction of ADHD in boys and girls using D-KEFS",2007 oxford journal clinical neuropsychology23(3):283-293

Farhan S. K. A., Rahman K. M. N., Rahman S. M., (2021). Improvement of verbal and non-verbal communication skills of children with autism spectrum disorder using human robot interaction. Proceedings of the IEEE World AI IoT Congress (AIIoT).IEEE; pp. 0356–0359.

Garg, S., &Sharma,S. (2020). Impact of Artificial Intelligence in Special Need Education to Promote Inclusive Pedagogy . International Journal of Information and Education Technology, Vol. 10, No. 7,

Georg,T. (2024).Review: Snap and Read.Perkins School for the blind. https://www.perkins.org/resource/review-snap-and-read/

Georgopoulos,V.C.,Malandraki,G.A.,& and Stylios, C.D.(2003) A fuzzy cognitive map approach to differential diagnosis of specific language impairment. Artificial Intelligence in Medicine. doi.org/10.1016/S0933-3657(02)00076-3

Ghanem, S. A.A.&Yahya , A.A .F. (2022). THE EFFECT OF USING MATHWAY ON DEVELOPING SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN NAJRAN, KINGDOM OF SAUDI ARABIA.European Journal of Education Studies. 10.46827/ejes.v9i4.4223

Gupta, S., & Chen, Y. (2022). Supporting inclusive learning using chatbots? A chatbotled interview study. Journal of Information Systems Education

High-Level Expert Group on Artificial Intelligence. (2019). A definition of AI: Main capabilities and scientific disciplines. European Commission. Available at: https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=56341.

https://www.texthelp.com/en-gb/products/read-and-write-education/how-to-improve-reading-comprehension/

Jain K., Manghirmalani P., Dongardive , J.,&Abraham,S. (2009).Computational Diagnosis of Learning Disability, International Journal of Recent Trends in Engineering, 2(3)

Kemp G., Smith M.,& and Segal J. (2024).Learning Disabilities and Disorders. Help Guide. Org. https://www.helpguide.org/articles/autism-learning-disabilities/learning-disabilities-and-disorders.htm

Kohli, M., Prasad,T.V. (2010). Identifying Dyslexic Students by Using Artificial Neural Networks. In: Proceedings of the World Congress on Engineering, London, U.K, vol. 1

Latif, S., Tariq, R., Tariq, S., & Latif, R. (2015). Designing an assistive learning aid for writing acquisition: A challenge for children with dyslexia. Studies in Health Technology and Informatics, 217, 180–188.

M. E., &Kossyvaki, L. (2018). Blending human and artificial intelligence to support autistic children's social communication skills. ACM Transactions on Computer-Human Interaction (TOCHI), 25(6), 35.

Mansilla, A., Ochoa, A., Ponce, J., Herrera, M., Hernández, A. S., &Cossio, E. (2017). Implementation of an chatbot in a serious game associated with the acquisition of social skills and the promotion of collaborative tasks in children. https://doi.org/10.1109/laclo. 2017.8120912

Margetts, H., & Dorobantu, C. (2019). Rethink government with AI. *Nature, 568*(7751), 163–165.

Melis, E and Siekmann, J.(2004). ACTIVEMATH: An Intelligent Tutoring System for Mathematics. In: Rutkowski, L., Siekmann, J.H., Tadeusiewicz, R., Zadeh, L.A. (eds.) ICAISC 2004. LNCS (LNAI), vol. 3070, pp. 91–101. Springer, Heidelberg

N. Sebe, I. Cohen, T. G.,&Huang,T.S. (2006) Emotion Recognition Based on Joint Visual and Audio Cues, Proceedings of the 18th International Conference on Pattern Recognition.

Nanni, L., & Lumini, A. (2009). Ensemble generation and feature selection for the identification of students with learning disabilities. Expert Systems with Applications, 36(2), 3896–3900. doi:10.1016/j. eswa.2008.02.06

Naqvi, A.(2020): Artificial intelligence for audit, forensic accounting, and valuation: a strategic perspective. Wiley .

Ouherrou, N., Elhammoumi, O., Benmarrakchi, F., & El Kafi, J. (2019). Comparative study on emotions analysis from facial expressions in children with and without learning disabilities in virtual learning environment. Education and Information Technologies, 24(2), 1777–1792.

Păsărelu, C. R., Kertesz, R., &Dobrean, A. (2023). The Development and Usability of a Mobile App for Parents of Children with ADHD. *Children (Basel, Switzerland)*, *10*(1), 164. https://doi.org/10.3390/children10010164

Rajapakse, S., Polwattage, D., Guruge, U., Jayathilaka, I., Edirisinghe, T., &Thelijjagoda, S. (2018). ALEXZA: A mobile application for dyslexics utilizing artificial intelligence and machine learning Concepts. In 2018 3rd International Conference on Information Technology Research (ICITR). https://doi.org/10.1109/icitr.2018.8736130

Rebsamen, B., Guan, C., Zhang, H., Wang, C., Teo, C., Ang, M. H., Jr, &Burdet, E. (2010). A brain controlled wheelchair to navigate in familiar environments. *IEEE transactions on neural systems and rehabilitation engineering : a publication of the IEEE Engineering in Medicine and Biology Society*, *18*(6), 590–598. https://doi.org/10.1109/TNSRE.2010.2049862

Roach, J . (2018). AI technology helps students who are deaf learn.

Russell, S.J and Norvig, P.(2003).Artificial Intelligence: A Modern Approach, 2nd edn., New Jersey

Sandy W.(2020). Co: Writer UniversalPredictive writing assistant valuable for certain students.Common Sense Education. https://www.commonsense.org/education/reviews/cowriter-universal#:~:text=Co%3AWriter%20Universal%20is%20an,help%20students%20get%20started%20writing

Shi, G., Key, S., and Benzoic, A. (2022) .The Role of Assistive Technology in Advancing Sustainable Development Goals. Front. Polit. Sci. 4:859272. doi: 10.3389/fpos.2022.859272

Slowík, J., Gažáková, E., Holeček, V., &Zachová, M. (2021). Comprehensive support for pupils at risk of school failure in inclusive education: Theory and school practice in the Czech Republic. *International Journal of Inclusive Education, 27,* 1–17.

Srihari,S., Collins,J., Srihari,R., Srinivasan,H., Shetty,S., &Griffler,J.B. (2008). Automated scoring of handwritten essays in reading comprehension tests, Artificial Intelligence, 172, pp. 300–324. 20.

UNESCO. (2009). Policy guidelines on inclusion in education. from https://unesdoc.unesco.org/ark:/48223/pf0000177849

UNICEF. (2021). Nearly 240 million children with disabilities around the world, UNICEF's most comprehensive statistical analysis finds. UNICEF. https://www.unicef.org/rosa/press-releases/nearly-240-million-children-disabilitiesaround-world-unicefs-most-comprehensive

Wang, M., Muthu, B., &Sivaparthipan, C. B. (2021). Smart assistance to dyslexia students using artificial intelligence based augmentative alternative communication. International Journal of Speech Technology. https://doi.org/10.1007/s10772-021-09921-0

Wang,D.,Han, H.,Zhan, Z., Xu,J. ,& Liu, K. (2015). A problem solving oriented intelligent tutoring system to improve students' acquisition of basic computer skills // Comput. Educ.

WHO. (2011). World Report on Disability. [Online]. Available: https://www.who.int/disabilities/world_report/2011/report.pdf

Wu, T.K., Meng, Y.R., Huang, S.C. (2006). Application of Artificial Neural Network to the Identification of Students with Learning Disabilities. In: International Conference on Artificial Intelligence, pp. 162–168

Zhou, L., Gao, J., Li, D. M., & Shum, H. (2020). The Design and Implementation of XiaoIce, an Empathetic Social Chatbot. Computational Linguistics, 46(1), 53–93. https://doi.org/10.1 162/coli_a_00368