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Navigating Artificial Intelligence in the Successful Implementation of Inclusive Education Practices

Raveenthiran Vivekanantharasa[1], Nova Asvino[2], M.D.B. Prasad Weerasinghe[3]

[13] The Open University of Sri Lanka
[2]UIN Fatmawati Sukarno Bengkulu

A B S T R A C T

In the present world, Artificial Intelligence (AI) is referred to as intelligent systems based on enormously large datasets that are capable of analyzing their surroundings in order to fulfil specific tasks in different fields. Like the influence of artificial intelligence impacts on different careers to achieve great feats, inclusive education is one important area that influences and develops by the integration of artificial intelligence in the successful implementation of inclusive education practices. This article mainly discusses how Artificial Intelligence (AI) is leveraged within educational environments to support students with disabilities and inclusive strategies and experiences. The main question connected with this article concerns about that the role and impact of AI across diverse educational settings and, in particular: "How is Artificial Intelligence (AI) being utilized within educational settings to support individuals with disabilities and promote inclusive education?" Focusing various educational strategies in teaching and learning for students in inclusive education practice this article aims to describe the key ideas of the article. In 21st century education system, inclusive education plays a pivotal role in reaching the quality level of education by helping students with special needs. Therefore, this article highlights the role of Artificial Intelligence in the successful implementation of inclusive education.

A R T I C L E I N F O

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*Corresponding Author E-mail:
rvive@ou.ac.lk

INTRODUCTION

Every child has the right to education. That also includes children with disabilities in acquiring quality education for their development. With the emphasis of the importance of education for students with special needs the concept inclusive education has been with various meaningful definitions. The 1973 IDEA legislation wrote into law rights to a free public education for all students regardless of their differences and disabilities related to how they learn. Some educators refer to inclusive education in terms of the phrase "least restrictive environment". This concept involves including all children in the same opportunities that the school has to offer the general population (Foster, 2025).

According to UNESCO (1994), "Inclusion is seen as diversity of needs of all learners through increasing participation a process of addressing and responding to the in learning, cultures and communities, and reducing exclusion within and from education. It involves changes and modifications in content, approaches, structures and strategies, with a common vision which covers all children of the appropriate age range and a conviction that it is the responsibility of the regular system to educate all children. Stainback (1992)

explained that "Inclusion facilitates integration in school systems when general and special education personnel, as well as curriculum and instructional procedures, are combined to provide educational experiences to meet the needs of the students in an integrated setup (Sahani & Patel, 2023).

Moreover, very specifically, UNESCO has defined it as, children with special educational needs have the same right to education as the others and should be able to have access to an ordinary school, which should integrate them in an education system focused around the individual and capable of accommodating his/her needs (Team SPK, 2024).

According to UNICEF, It is important to understand what is and is not inclusive education: Exclusion: students with disabilities are denied access to education in any form. Segregation: education of students with disabilities is provided in separate environments designed for specific, and in isolation from students without disabilities. Integration: placing students with disabilities in mainstream educational institutions without adaptation and requiring the student to fit in. Inclusion: education environments that adapt the design and physical structures, teaching methods, and curriculum as well as the culture, policy and practice of education environments so that they are accessible to all students without discrimination. Placing students with disabilities within mainstream classes without these adaptations does not constitute inclusion.

The integration of individuals with special needs and disabilities into mainstream education represents a pivotal objective in global educational reform, with the aim of guaranteeing equitable access and fostering inclusive societies. The advent of new technologies has led to the emergence of Artificial Intelligence (AI) as a potentially transformative tool with significant promise in supporting the delivery of inclusive education.

However, inclusive education is a system that has set processes in place to include all children in the academic, non-academic, and extracurricular areas of overall school. Those processes should be supported by teacher best practice strategies that help all children to feel included. An inclusive education system also should include supports for a student's behavior in all three areas.

Why inclusive education is important?

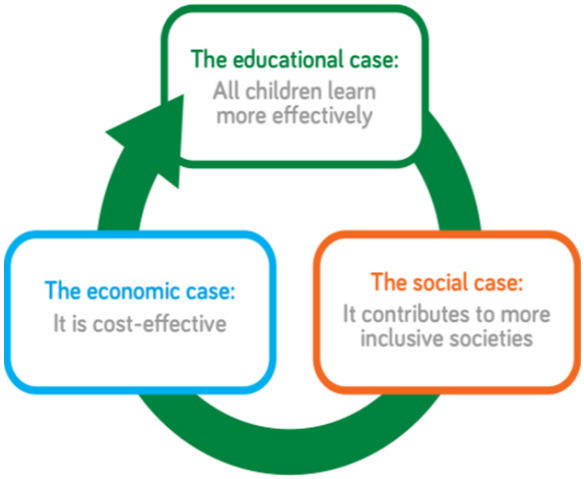
The major impetus of inclusive education came from the 1994 World Conference on Special Needs in Education in Salamanca. The conference recommended the principle of inclusion in the words, "….Schools should accommodate all children regardless of their physical, intellectual, social, emotional, linguistic, or other conditions". From that the importance of inclusive education was highly recognized by the educators around the world. Inclusive education is a basic human right and it provides the foundation for a more just society. All learners have the right to education, regardless of their characteristics or difficulties. It is mainly a purposeful effort to provide educational opportunities to all those groups which in the past,

have been excluded from having access to education.

Before IDEA (Individuals with Disabilities Education Act), many students with special needs were left out. Often times students were sent home or expelled from school due to their differences. They were not afforded the accommodations that support students today. A true inclusive education system looks at the needs of the whole child in all areas of school (Foster, 2025). Inclusive education Promotes Equality and Non-discrimination of the education system for children with special needs. By ensuring all students including students with special needs, regardless of their abilities or backgrounds, have equal access to quality education, inclusive education helps to break down barriers and stereotypes, fostering a more equitable society.

Moreover, preparing students for a Diverse Society is another importance of inclusive education in the education system. By reflecting the diversity of our society within the classroom environment, inclusive education better prepares students for real-world experiences. They develop a more nuanced understanding of the world, fostering the skills to thrive in diverse environments and navigate social complexities.

Inclusive education practices are a part of quality education of 21st century. Sustainable development goals 2030 clearly explains the importance of quality education in goal number four of the 17 goals of SDG. In SDG goal four there are some important initiatives to be implement to ensure quality education. The first initiative is substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship and Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, nonviolent, inclusive and effective learning environments for all. To ensure quality education in the structure of education system, implementing inclusive education successfully is one of the important tasks of the education society. Therefore, successful inclusive education implementation is important for ensuring quality education practice. Based on the figure below, it is clearly explained that how inclusive education takes the role of importance in education, society, and economy of the world.



Sourcefrom:https://www.unicef.org/eca/sites/unicef.org.eca/files/IE_summary_accessible_220917.

ARTIFICIAL INTELLIGENCE ON INCLUSIVE EDUCATION

Artificial Intelligence (AI) can be defined as machines that can perform the tasks that humans carry out through their thinking. The usage of Artificial intelligence is growing at an unprecedented rate & it is rapidly changing the aspects of human life (Jamal, 2023). Castrounis in 2016 defined AI "The ability to perceive information and retain its knowledge to be applied towards adaptive behaviors within an environment or context." and the second definition by Rapid Miner in 2017 is "Any technique which enables computers to mimic human behavior". Moreover, according to the Council of Europe, "AI is a collection of sciences, theories, and methods aimed at replicating human cognitive abilities through machines. UNICEF defines AI as machine-based systems guided by human-defined objectives that predict, provide recommendations, and make decisions impacting real or virtual environments.

Technology always offers an education lifeline for most of disadvantaged students in the world. Especially, for learners with disabilities, technology offers potential by providing multiple ways of representing information, expressing knowledge, and engaging in learning, which can provide fair and optimized access to the curriculum, while developing their independence, agency, and social inclusion. It can also facilitate

personalized learning, communication, and interaction of learners with disabilities with their peer and teachers, and stronger social skills and networks.

Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR) have immense potential in education for diverse learners. AI provides personalized support and tools for academic success and overall well-being while VR communication training creates an immersive environment for skill development. By integrating AI and VR, we can transform education, offering tailored experiences that help diverse learners with their progression and mental well-being to thrive and succeed. Therefore, AI supports for diverse learners in inclusive education system with VR and AR technology in an immense way. It is clearly explained how inclusive education system is advantaged with AI.

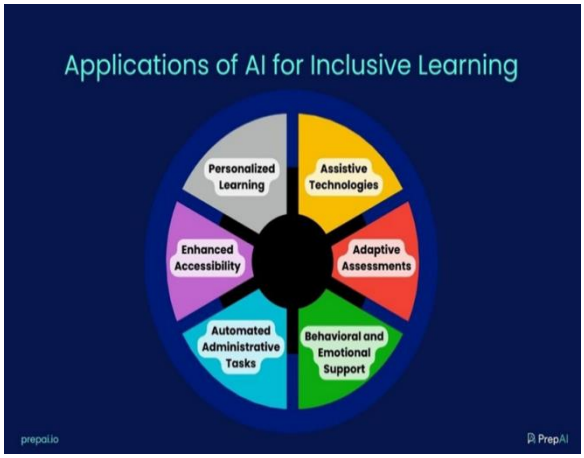
First, AI helps inclusive education practices in the application of Assistive Technology (AT). Assistive technology is technology used by individuals with disabilities in order to perform functions that might otherwise be difficult or impossible. Assistive technology can include mobility devices such as walkers and wheelchairs, as well as hardware, software, and peripherals that assist people with disabilities in accessing computers or other information technologies in education field. In the classroom environment of inclusive education, teaching, learning, curriculum development, and extracurricular activities are assisted with AI technology.

AI-powered tools like text-to-speech, speech-to-text, and real-time transcription services help students with visual or hearing impairments access educational materials more easily. Generative AI has further enhanced the role of assistive technologies by quickly creating content to suit the diverse needs of students.

According to Ankush sharma (2024), AI can create assessments that adjust in real-time based on a student's performance, ensuring that the difficulty level is appropriate and providing immediate feedback. Moreover, teachers don't have to spend hours creating test papers and quizzes. Online assessment tools like PrepAI can automatically convert input data into tests with lower-order and higher-order thinking questions that test the various abilities of the students.

AI supports inclusive education in line with Open Distance Learning (ODL). When students involve with teaching and learning activities online through ODL system, AI supported technologies help for the development of inclusive education system through ODL. This is also another advantage of AI in inclusive education system.

Moreover, the more specialized the device, the greater the need for specialized training for teachers to use it effectively in the learning environment. But teachers often lack specialized training. In Saudi Arabia, 54% of special education needs teachers had only basic knowledge of using assistive technologies, while 28% received no training in implementing such technologies, and 10% had no knowledge at all on using them (UNESCO, 2024). With the support of AI in inclusive education, facilitating universal design for the assessment of learners with disabilities or learning difficulties is also introduced by the teachers in inclusive education classroom setup. The figure below clearly explains the role of AI in inclusive education.



Source from: https://www.prepai.io/blog/ai-in-inclusive-learning/.

ETHICAL CONCERNS OF AI ON INCLUSIVE EDUCATION

Artificial intelligence is progressing at an astonishing pace, raising profound ethical concerns regarding its use, ownership, accountability, and long-term implications for humanity. This ethical concerns also applies to the inclusive education system. When applying AI in inclusive education system, it is very important to apply ethical

concerns of AI. Hanna et al., (2024) indicated that AI ethics can be defined as "a set of values, principles, and techniques that employ widely accepted standards of right and wrong to guide moral conduct in the development and use of AI technologies." AI ethics are necessary because a variety of harms to individuals and society might result from the misuse, abuse, bad design, or negative unintended consequences of AI systems. Furthermore, AI ethics are a set of values, principles, and techniques that employ widely accepted standards of right and wrong to guide moral conduct in the development, deployment, use, and sale of AI technologies.

Bias and Discrimination

The first ethical concern related issue that should be taken into account is bias and discrimination. AI systems are trained on massive amounts of data, and embedded in that data are societal biases. Consequently, these biases can become ingrained in AI algorithms, perpetuating and amplifying unfair or discriminatory outcomes in crucial areas such as hiring, lending, criminal justice, and resource allocation (CAPITOL Technology University, 2023). When AI influences inclusive education systems related concerns like teaching and learning, bias and discrimination related ethical issues can be done by the school enviornment. Therefore, checking this ethical concern is important for teachers and students when applying AI in inclusive education.

Transparency and accountability

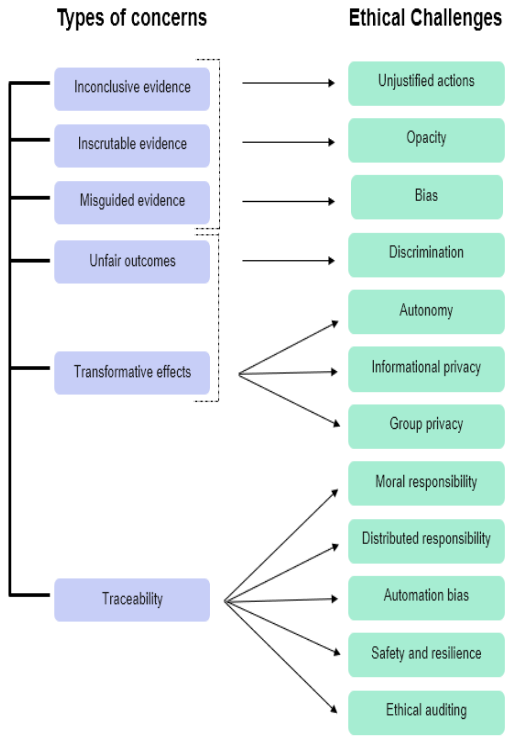
Transparency and accountability are another concerns of AI ethics. AI systems often operate in a "black box," where these systems offer limited interpretability of how they work and how they arrived at certain decisions. In critical domains like health care or autonomous vehicles, transparency is vital to ascertain how decisions are made and who bears responsibility for them. Clarifying accountability is particularly important when AI systems make errors or cause harm, ensuring appropriate corrective actions can be taken. In inclusive education system, it is very important to maintain transparency and accountability in teaching and learning process of inclusive education system.

Privacy, security, and surveillance

It is crucial maintaining privacy, security, and surveillance in the application of AI. The effectiveness of AI often hinges on the availability of large volumes of personal data. When we use personal data of students with special needs, it sometimes causes issues with privacy and security. Therefore, In AI, preserving individuals' privacy and human rights becomes paramount, necessitating robust safeguards against data breaches, unauthorized access to sensitive information, and protections from extensive surveillance.

Social Manipulation and Misinformation

Social manipulation and misinformation is another ethical concern factor of the use of AI in inclusive education systems. This should be seriously taken concern as it influences on family related matters of students with special needs. According to CAPITAL Technology University (2023), Fake news, misinformation, and disinformation are commonplace in politics, competitive business, and many other fields. AI algorithms can be exploited to spread this misinformation, manipulate public opinion, and amplify social divisions. For example, technologies like deepfakes, which are capable of generating realistic yet fabricated audiovisual content. When inclusive education system is set up with the support of AI in teaching and learning of inclusive education, school environment should take more concern on this social manipulation and misinformation related ethical issue. The figure below clearly explains about ethical concerns in the use of AI in inclusive education and even in other aspects.



Sourcefrom: https://www.coe.int/en/web/human-rights-and-biomedicine/common-ethical challenges-in-ai

Moreover, when analyzing the ethical concerns of AI, it is Human-centered design and focus on designing AI systems with the needs and wants of users in mind, rather than just on technical capabilities. Therefore, AI application should be maintained with more attention as human can control it based on their purposes.

CHALLENGES OF AI ON INCLUSIVE EDUCATION

Like a coin has two sides there are challenges and ethical concerns that need to be considered in the application of AI in inclusive education system. AI brings both benefits and challenges to parenting. One challenge is the shift in discipline patterns. AI provides structured tools like task reminders and digital access controls, but over-reliance on AI can make discipline more algorithmic and reduce parents' role in teaching moral values (Glassman et al., 2021).

Another issue is the digital literacy gap between parents and children. Children often adapt to AI faster than their parents, creating a divide where they become more independent and rely less on parental guidance (Newman et al., 2021). Excessive dependence on AI for decision-making is also concerning. Parents who rely too much on AI may lose sensitivity to their children's emotional needs. Some parents "delegate" parenting to AI, using educational chatbots for learning instead of direct interaction. This weakens the parent-child bond, making it crucial for parents to stay engaged despite AI's convenience (UNESCO, 2023). Moreover, over-reliance on AI-powered devices and applications for communication can potentially weaken in-person communication skills and lead to social isolation. For example, if family members and teachers only communicate through texting or messaging apps, they may miss out on the nuances of in-person communication. Families need to balance their use of AI-powered devices and applications with in-person communication (Ntoutsi et al., 2020).

When an AI-based technology may become present in a child's life to such a significant extent that it takes over the role of a parent, questions arise about its impact on the child's psychological and cognitive development. The excessive use of smart agents may impact children's social and cognitive development. Overuse of smart agents potentially leads to reduced interpersonal interactions between parents and their children. Since personal interactions between parents and their children are essential for the children's development of social skills, problem-solving skills, Previous studies identified positive effects of implementing personal informatics tools to track children's data. They highlighted that it not only improves parents' understanding of their child's patterns but also reduces the need for frequent physical check-ups by facilitating the transfer of baby-related information, such as sleep patterns, movements, and signs of distress, heart rate or breathing, to mobile applications (Lupton, 2020). Conversely, Wang et al,. (2017) also identified that using baby monitoring or child habits monitoring may have detrimental effects on parents' mental health as it can increase their anxiety. Cognition and empathy (Lanjekar et al., 2022).

CONCLUSION AND RECOMMENDATION

Inclusive technologies with AI support accessibility for students with disabilities who face some of the most significant barriers in accessing quality education. In using inclusive technologies, though a variety of technologies like AI are available for

people with disabilities who face various barriers to education and learning, there are number of challenges in applying AI in inclusive education system. In a nutshell, AI in inclusive education plays an important role for the effective implementation of inclusive education practices.

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