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Artificial Intelligence (AI) for Inclusive and Accessible Education

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ABSTRACT

The emergence of artificial intelligence (AI) in education is regarded as a vital instrument in the realm of inclusive education, offering a means to enhance accessible learning for all students regardless of personal challenges. This paper explores the transformative potentials and challenges associated with the use of artificial intelligence (AI) in fostering inclusive and accessible education. The study also analyzed some advantages and challenges of incorporating AI in teaching and highlighted how it influences inclusion and accessibility. Based on the literature, some of the advantages of AI in learning are improved performance, motivation and encouragement of students especially those with disability. Some difficulties associated with the use of AI for inclusive and accessible education, such as technological difficulties, lack of trained facilitators, limitations of data base amongst others were pointed out. Finally, practical recommendations for educators, policymakers and developers are offered to collaboratively harness AI in a responsible manner, ensuring that its benefits reach all learners.

Keywords: *Inclusive Education, Accessible Education, Artificial Intelligence, AI in Education*

INTRODUCTION

Education as a transformational tool to both an individual and society at large cannot be fully discussed without special considerations of many factors. These factors may include majorly how to make it inclusive and accessible to all learners bearing in mind of different functional limitations of individual. These limitations may include physical, intellectual as well as sensory impairment, medical conditions or illness which are basis for discrimination. Notwithstanding every individual in the society is entitled to exercise their civil, political, social, economic educational and cultural rights. This is why Omede (2010) postulated that "the importance of education to humanity and the economic sector in particular of any society cannot be over emphasized as it gives ample opportunity to those that are educated to contribute meaningfully to national development be it agriculture, health, sport, etc."

This meaningful contributions to the society by all can be empowered more through inclusive and accessible education. Inclusive education aims to ensure that all learners, including those with disabilities have equitable access to quality learning. The United Nations (2017) affirmed that the fundamentals of inclusive education consists of upholding morals, both religious and non-religious norms perspective and facilitate all students with relevant and worthwhile education. They further emphasized that one of the objectives of inclusion is to afford all students with equal educational opportunities. With the recommendations, yet globally challenges remains immense: an estimated 240 million children live with disabilities and about half of them are out of school entirely, while those in school often lack adequate support. These gaps underscore the urgency for innovative solutions.

Artificial Intelligence (AI) has emerged as a promising tool to address such disparities by providing personalized support and adaptive learning resources. The emergence of Artificial Intelligence (AI) influences almost every facet of education and is also accepted and valued by educators (Chen et al. 2020: Hwang et al 2020). It is an undeniable fact that the integration of AI in education transforms

teaching and learning. In addition to making learning more personal. AI offers proper feedback and this implies a more inclusive, accessible and effective learning environment.

Holmes et al (2019) cautioned that although AI is expedient and can transform education, desirable educational outcome do not occur by merely using AI computing technologies. It is therefore necessary to have a comprehensive understanding of the effects on the current educational system to ascertain and arrive at a sustainable development and deployment of the use of AI technologies in schools. Thus this paper seeks to investigate the impact of AI in inclusive and accessible education through a review and analysis of the existing Literature.

Concept of Inclusive Education

According to the committee on the rights of persons with disabilities (UN 2016), inclusive education means;

i. A fundamental right to education
ii. A principle that values students' wellbeing, dignity, autonomy, and contribution to society.
iii. A continuing process to eliminate barriers to education and promote reform in the culture, policy and practice in schools to include all students. Additionally, inclusive learning means that students with disabilities and other disadvantages are taught with their peers in a mainstream classroom for a majority of the school day. When most experts speak of "inclusive learning"; this does not include special units or special classroom (segregations), or placing children with disabilities in mainstream settings as long as they can adjust (integration).

Inclusive education begins with the assumption that all children have right to be in the same educational space (Cobet 2018; Florian, Black-Hawkins & Rouse 2017). Its approach focuses more on educating students with special educational needs. Under the inclusive model, students with special needs spends most of their times with non- disables students (Wekepedia).

Therefore, an inclusive environment should be nurturing and above all safeguard children from harm and strive to educate all. Educators must make great effort to ensure students receive adequate education. Hence, the curriculum should be revised to cater to the needs of all students. Meg et al. (2017) also affirmed that suitable opportunities must be afforded so that all students are free to optimize their aptitude. Inclusive education affirms the following principles: acceptance, accessibility and assessment reform and to achieve these principle, educational institution are obligated to acknowledge, recognise and make the necessary modifications to address the needs of all the students. This implies knowing the students well and providing learning activities that address their individual needs and make learning accessible to them.

Concept of Artificial Intelligence

Artificial Intelligence (AI) represents a cutting edge technological frontier that emulates human intelligence through machine learning algorithms, neural network and natural language processing. AI technologies are gaining growing recognition as tools capable of significantly transforming educational practices and enhancing the effectiveness of inclusive approaches to learning. Ocana et al. (2019) submitted that AI is marking a major turning point in technological evolution because it uses enormous volumes of data and computational capability to replicate various human intellectual abilities.

AI and Inclusive Education

AI forms an integral instrument for effective teaching and a conveyor of inclusive education. Chauhan (2017) affirms also that AI technologies are very resourceful in society and education, and the advent of these technologies can significantly transform education and have a purposeful intervention in the overall well-being of the students. Similarly, Halverson (2018) conjectured that these technologies afford more equitable opinions in education and allow inclusion.

Dreamson (2021) opined that although diversity exists in all cultures, it is not negative because it provides opportunities for intercultural dialogue and thus enhances inclusion. Abidova (2023) also hypothesized this view and further suggested that a genuinely inclusive education environment frequently stimulates growth and heightens development among students.

The positive results of the application of AI in education are not automatic. They largely depend on how they are included in the teaching and learning process by professionals to ensure inclusiveness and accessibility.

RESEARCH METHOD

This non empirical study involves a critical review of existing literature, analysis of scientific publications and a review of existing principles and theories to construct an informed perspective on the role of Artificial Intelligence in promoting inclusive and accessible education.

RESULTS AND DISCUSSION

Key AI Technologies Enhancing Accessibility & Inclusivity

Text-to-Speech (TTS) & Speech-to-Text (STT) Tools

Text-to-Speech (TTS) tools convert written content into spoken words—vital for learners with visual impairments or reading difficulties like dyslexia. Examples include NaturalReader, ReadSpeaker, and Microsoft Immersive Reader. Speech-to-Text (STT) tools (e.g., Google Voice Typing, Otter.ai, Microsoft Dictate) enable students who struggle with typing or have motor challenges to take notes or participate by speaking instead. These tools remove barriers for students with disabilities and help make learning more inclusive.

Optical Character Recognition (OCR) & Screen Readers

OCR transforms images of text into readable digital text, then often read aloud—crucial for visually impaired students. Screen readers like JAWS, NVDA, VoiceOver, TalkBack help students navigate digital content independently.

Assistive Reading & Content Navigation (e.g., DAISY)

The DAISY format provides advanced audio navigation for complex texts, offering features like bookmarks, line-level navigation, and multi-modal presentation—designed for learners with print disabilities.

AI-Powered Image Description & Object Recognition

AI can automatically generate alt-text, image descriptions, and real-time object recognition to support visually impaired students, eliminating manual overhead.

Translation & Multilingual Support

Tools like Google Translate and Microsoft Translator help non-native speakers and multilingual learners access content and follow instruction. Sign language avatars and lip-reading recognition are emerging options.

Adaptive Learning Systems & Intelligent Tutoring Systems (ITS)

AI platforms like Squirrel AI and Carnegie Learning dynamically adjust content and difficulty based on individual student performance, offering a tailored learning pace. ITS can deliver step-by-step guidance, supporting students—especially those with learning challenges such as dyslexia or ADHD.

Real-Time Captioning & Transcriptions

AI-driven captioning (e.g., Zoom auto-captions, Chrome Live Caption, YouTube auto-captions) assists students who are deaf or hard of hearing by providing real-time text of spoken lessons.

AI-Generated Tactile Graphics (TactileNet)

TactileNet leverages AI models (e.g., Stable Diffusion) to generate tactile graphics compliant with accessibility guidelines—crucial for visually impaired students dealing with charts, diagrams, and other visual content.

Vision-Assistance Apps Like Seeing AI & Be My Eyes

Microsoft's Seeing AI app uses the camera to identify objects and describe scenes audibly for visually impaired users. Be My Eyes offers both human volunteer assistance and be My AI, an image-describing assistant powered by GPT-4 for visually impaired users.

Personalized Audio Learning Platforms (e.g., Audemy)

Audemy, an AI-powered audio learning platform, personalizes learning for blind or visually impaired students using engagement-driven content adaptation—currently serving thousands in co-design with accessibility experts.

Open-Source ML Platforms for Accessibility

Some inclusive educational platforms use open tech and machine learning (e.g., YOLOv5 for object recognition, G2P for natural TTS) to build accessible, cross-platform apps with voice and visual assistance.

Transformative potentials of AI in teaching

1. Personalized Learning and Differentiated Instruction: AI powered platforms like Carnegie learning and dramabox use machine learning algorithms to adapt instructional materials in real time, helping students master concepts at their own pace (Holstein et al 2019). This also enables personalized learning pathways by analysing data on students learning styles, progress and challenges thereby promoting inclusion and accessibility.
2. Breaking Language Barriers: AI tools such as machine translation and natural language processing facilities multilingual education and support learners who are non-native speakers of the language of instruction.
3. Predictive Analytics and Early Intervention: Large datasets can be analysed with the use of AI tools to in other to predict which student are at the risk of falling behind or dropping out. This allows educators administrators to intervene proactively.
4. Learning analytics platforms like civitas learning helps institutions identify students in need of support enabling data-driven decisions that foster equity.
5. Assistive Technologies for Learners with Disabilities: AI enhances assistive technologies such as speech recognition, text-to-speech predictive text, and real-time captioning, which support students with visual, auditory, and mobility impairments. These tools empower students with disabilities to participate fully in mainstream educational settings.
6. Enhanced Engagement through intelligent content: AI supports the creation of interactive learning materials such as simulations, virtual reality (VR) and gamified learning environments AI-based gamification strategies have been found to significantly improve learner participation and retention (Bia, Hew & Huang 2020).

Generally, AI in learning brings transformative advantages such as improved performance, motivation, engagement, immediate feedback, and data driven insights.

However, its successful implementations requires ethical consideration and equitable consideration and equitable access to ensure it benefits all learners.

Difficulties Associated with the use of AI in fostering inclusive education.

Technological difficulties is one of the biggest challenges of AI in fostering inclusive education. According to UNESCO (2021), the digital divide exacerbates inequalities as learners without access to AI tools are left behind. Again, Warschauer and Matuchniak (2010) highlighted that disparities in access to technology can reinforce social and educational exclusion instead of reducing it.

Again lack of trained facilitators is a barrier to the use of AI in fostering inclusive education. Teachers play a central role in inclusive education, yet many lack the necessary training to integrate AI into classrooms effectively. Holmes et al (2019) emphasized that without adequate teacher training, AI tools may not be used inclusively. In some cases, educators may resist AI due to fear of being replaced.

Furthermore, there is linguistics barrier in effective use of AI for teaching. Most AI educational tools are often developed in dominant language such as English thereby limiting accessibility for learners from diverse linguistics backgrounds UNESCO (2020) noted that the lack of local language AI tools hinders inclusivity in non-English speaking regions.

Also, there is cost and resources constraints. Implementing AI – driven inclusive education tools requires sustainable financial investment and infrastructure. Low-resource schools may find it difficult to adopt such system.

CONCLUSION

Although AI technologies unquestionably enhance education, particular considerations must be afforded to inclusivity to further incorporate all students and provide quality education. AI technologies can unquestionably play a more significant role in supporting inclusion. Because technology does not function in isolation and is integrated into society, they both complement each other. This paper presented a general overview of AI technologies and how they impinge on inclusive education. Even though various types of AI and new emerging technologies used for inclusive education were not specifically identified, AI supports and encourages inclusion. Thus, their principal benefits such as improving the overall competencies of students and energizing and motivating their abilities must not be undervalued because AI continues to affirm inclusive education, brings out the best in teaching and learning, and promotes inclusive education.

RECOMMENDATIONS

Based on the reviews and discussions, the following are offered for educators, stakeholders and policy makers:

1. Invest in teachers' capacity and professional development for better use of AI technologies.
2. Prioritize low-cost, offline-capable solutions and infrastructure equity.
3. Measure accessibility and inclusion outcomes not only test scores.
4. Policy makers and society must promote an awareness of inclusion.
5. Teachers and learners should be involved in all steps of policy formulation for inclusive education
6. Teaching and learning should incorporate AI technologies.
7. Learning should be learners centred with active participation.

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