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Artificial Intelligence in Higher Education: Bridging the Gap for Students with Disabilities

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Abstract: *Students with disabilities experience (SWDS) difficulties in learning due to limitations placed on them by their defect. To meet their learning needs distinguishing educational provisions from regular education were introduced into educational system which consist of special teachers and modification of curriculum, instructional procedures, methodology, instructional materials and learning environment contingent on category and magnitude of disabilities. Similarly, given that learning has to be effective; inclusive education in regular educational institutions was introduced. Nevertheless, while those who cannot benefit from inclusive education due to the severity of their handicap; provisions were made to accommodate them in special classes and special schools. These provisions are indeed beneficial to SWDs. However, introduction of Artificial Intelligence (AI) in tertiary institutions personalizes and has been found to enhance learning for SWDs. Moreover, its use is not without challenges which need to be addressed to enable them benefit maximally from this novel and unique technology. This paper, therefore, through evaluative and prescriptive methodology using google search on the theme, concepts and keywords examines the type of AI technologies used by SWDs in higher education, benefits and challenges. Finally, the paper offers some suggestions on overcoming these challenges to enable SWDs benefit maximally from the usage.*
Keywords: Artificial Intelligence (AI) technologies, higher education, challenges, students with disabilities (SWDs).

INTRODUCTION

Conceptual definition of terms

Students with disabilities (SWDs)

Disability is a condition that is associated with congenital or acquired defect which is either structural or biochemical. Students with disabilities (SWDs) are therefore persons with

structural or biochemical abnormalities. They could also be seen as persons with "physical, intellectual and psychiatric disorders" (Springer Publishing Connect, 2023). However, for educational remediation they can be classified as persons with physical, health, intellectual, visual, speech, hearing, learning impairments and behaviour disorders. In most cases disabilities affect their learning and performing at any given task which require the modification of classroom instructional procedures to suit their learning needs. SWDs face unique challenges with learning in higher education. Nevertheless, advancements in artificial intelligence (AI) shows promise with possibility of providing solutions to these challenges, bridge these gaps and enhance learning.

Artificial Intelligence (AI)

Artificial Intelligence is a means in which through data sets "digital computer or computer-controlled robot perform some tasks (Copeland, 2023) such as teaching, learning, solve problems, "interpret the meaning of text, voice, images, identify trends, and form conclusions" (Microsoft, 2019).

Higher education

Higher education is the formal training students undergo after secondary education also referred to as post-secondary education and tertiary education. Its duration ranges from 1 year to 3 or more years depending on the course of study. Students with disabilities are enrolled in higher institutions in inclusive settings situated in universities, polytechnics or colleges of education and grouped into undergraduate or post graduate programmes. For example, "in 2015 and 2016, nearly 20 percent of undergraduate students in the United States reported having a disability" (US Department of Education, 2021) and "between 18% and 34% of Canadian college and university students have disability (Canadian University Survey Consortium, 2020, 2021; Fichten et al, 2018). However, the actual figure is probably more, due to the fact that many SWDs decide not to divulge their structural or biochemical abnormalities to their educational institutions. For example, US Department of Education (2022) study in the United States shows that "only 37% of students with disability reported their disability to their college. Their dropout rates are substantially higher and their graduation rates are significantly lower than these rates for students without disabilities". The dropout rates could be attributed to some challenges such as societal negative attitude towards their care and welfare, architectural barriers, inaccessibility and difficulties in the use of assistive technologies in tertiary institutions.

Moreover, despite these challenges a means of enhancing SWDs learning is artificial intelligence (AI). Nevertheless, it comes with some challenges in the usage which need to be addressed to enable SWDs in tertiary institutions benefit maximally from this novel and unique technology. This paper, therefore, through evaluative and prescriptive methodology using google search on the theme, concepts and keywords examines the type of AI

technologies used by SWDs in higher education, the benefits, challenges and proffer suggestions on overcoming these challenges to enable them benefit maximally from the usage.

ARTIFICIAL INTELLIGENCE AND THE EDUCATION OF SWDS IN TERTIARY INSTITUTIONS

The landscape of tertiary institutions is undergoing a transformation fuelled by advancements in artificial intelligence (AI). It is now taking its first steps into the unchartered territory of the possibilities opened by AI in teaching and learning in higher education. Implications and possibilities of these technological advances are quite visible. By way of example, recent advancements in non-invasive brain-computer interfaces and artificial intelligence are opening new possibilities to rethink the role of the teacher, or provide steps towards the replacement of teachers with teacher-robots and virtual teacherbots and make available tools in assessing students' attentiveness to learning. However, SWDs often require accommodations and support services to access learning materials and participate effectively in learning (Singh, & Rose, 2015) at variant with the traditional method of face-to-face teaching which pose learning challenges in higher education. Nevertheless, solution lies within the ambit of AI as it offers innumerable assistive technologies that can facilitate and enhance learning for SWDs through the following ways:

1. Individualized learning: AI in education individualizes learning for SWDs by modifying teaching and learning activities in tandem with individual learning needs. Zheng et al. (2018) investigated the impact of AI-based adaptive learning systems on the rate of learning disabled students. The result demonstrated significant improvement in learning outcomes for SWDs and showcasing AI's ability to tailor subject matter in line with individual learning experiences.
2. Assistive technologies: These are technologies that are adapted to enhance learning of SWDs through "text-to-speech and speech-to-text conversion tools which aid the learning of students with visual or speech impairments" (Chiancone, 2023), textbooks and class materials which are converted to audio materials and speech recognition software for voice-based note-taking and interaction for the visually impaired students. Others include AI-driven transcriptions which provide alternative ways to engage the learning disabled students with lectures and discussions and Natural Language Processing (NLP) which creates interactive and engaging educational content for SWDs.
3. Virtual and augmented technologies: These AI technologies can be particularly beneficial to SWDs such as virtual simulations and augmented content which provide hands-on experiences and enable students to grasp complex concepts in a more tangible manner. Similarly, the virtual science lab engages students with mobility issues and enables them to conduct experiments in virtual environments.

4. Intelligent tutoring systems: These are AI technologies modified to suit SWDs individual learning styles and enable them learn at their own pace.
5. Accessibility and accommodations: AI technology has automating and accessibility features to teach SWDs. For example, Natural language processing (NLP) creates accessible content by generating alt text for images and ensures screen readers convey visual information to students with visual impairment. Additionally, AI can generate automation closed captions video educational materials accessible to students with hearing impairment.
6. Break down learning barriers: AI removes some learning impediments experienced by SWDs through:

- Tailored learning where students acquire knowledge and skills according to their learning needs and pace of learning. For example, students with dyslexia learn with AI-powered tutors which adjust their pace of learning and format of instruction.
- Sensory support engagement where AI-powered application transcribes lectures into text for students with hearing impairment and text-to-speech tools which assist visually impaired students in learning.
- Diverse communication undertaking where AI helps hearing impaired students learn through features like real-time sign language translator.
- Intelligent AI powered assistant which aids SWDs in performing some learning tasks such as note-taking, recapitulation of salient facts, assisting in reminder, organization of learning experiences and helping students with time management.

7. Adaptive learning platforms through AI technology set the learning experiences of SWDs by personalizing learning, modifying content delivery format, pace of instruction and learning style based on the student's rate of progress in attaining mastery learning.

BENEFITS OF ARTIFICIAL INTELLIGENCE TO THE EDUCATION OF SWDS IN TERTIARY INSTITUTIONS

Artificial Intelligence is found to be desirable to the education of SWDs and the following are identifiable benefits:

1. Facilitates and enhances learning.

Al as an assistive technology facilitates and enhances learning of SWDs. For example, text-to-speech and speech-to-text conversion empower visual and speech impaired students with learning, AI-powered transcription removes barriers to auditory information by generating captions for lectures and videos and AI-powered tools like speech recognition and text-to-speech software break down communication barriers for students with disabilities (Chiancone (2023). AI provides around-the-clock care using Robotics to help

SWDs learn, such as Siri, Alexa (Lynch, 2018), dictation, smartphone, and live-transcription apps.

2. Creates content descriptions in learning

AI can be used to create content description for the visually impaired. For example, "turnaround time is significant when producing things like text descriptions or a complex set of test questions for students who are legally blind or have low vision and AI technologies can be used to automatically describe images. AI-based systems can also be used to do a "first pass" at describing content. Subject matter experts could then refine the content or depending on the quality of the description, determine whether the content should be written from scratch" (EDUCAUSE, 2023).

3. Creates webpage interactions in learning

   AI technology through webpage app allows students who cannot see what they are learning to interact with the assistance of a spoken dialogue and get feedback, such as Alexia, Amazon Echo and Apple Siri.

4. Fosters inclusive learning environment.

The benefits of AI extend beyond just providing access. It can foster a more inclusive learning environment by:

- Facilitating communication. Real-time captioning and language translation tools can enhance communication between SWDs with teachers, peers and caregivers.
- Enhancing social interaction. AI-powered virtual assistants can enhance social and emotional support for SWDs.
- Promoting self-advocacy. AI tools can empower SWDs to identify learning challenges and suggest ways of overcoming them.

5. Unlocks access to learning.

AI-powered applications can help SWDs access and process information, such as visual and speech impaired students. AI-powered transcription can create captions for lessons and videos and ensures equal access to auditory information by the hearing impaired. Additionally, AI can offer enhancement tools or alternative keyboard layouts to meet the learning needs of SWDs.

6. Produces personalization of learning

AI can individualize learning experience by modifying content and pace of learning to suit individual learning needs. For example, intelligent tutoring systems can identify a student's strengths and weaknesses, and then modify difficulty level of lesson content to improve learning experience. "It can analyze student data and learning patterns, tailor content difficulty and suggest resources based on individual learning needs" (Srinivasa, & Bhatnagar, 2022) which enable SWDs learn at their own pace and preferred learning style with ease.

7. Improves learning outcomes

AI improves SWDs rate of learning and performance at required task. For instance, AI-powered writing assistants can help students with learning disabilities overcome challenges with grammar, sentence structure and organization. AI-based feedback systems can provide more detailed and constructive feedback on assignments. It can analyse SWDs strengths and weaknesses, modify content, pace and style of learning contingent on the category and magnitude of disabilities which thus improve mastery learning.

8. Produces conducive learning environment

AI through the provision of personalize learning makes the learning environment favourable for SWDs as they learn at their own pace with the aid of assistive technologies contingent on the category and magnitude of disabilities. "AI tools can analyze student data and pattern of learning, tailor content difficulty, suggest resources based on individual needs and foster a more effective and engaging learning environment for SWDs" (Srinivasa, & Bhatnagar, 2022).

9. Saves time and cost in learning

Al makes learning faster and easier resulting into reduction of the amount of time SWDs spend in learning thereby saving time and cost of learning.

10. Provides assistive technologies

Al provides SWDs assistive technological learning tools which makes learning to be easier and faster.

11. Produces global access to quality education.

AI makes it possible for SWDs to have access to high quality education by the provision of information on existing and current knowledge on various academic disciplines around the world "through online when the studies require internet connectivity, offline when the resources for the learning do not necessitate a constant online connection, synchronous when all learners work together at the same time and asynchronous when learners can work

at different times" (Naidu, 2006) thereby making it possible for global access to quality education.

CHALLENGES ON THE USE OF AI EDUCATIONAL LEARNING TOOLS BY SWDS IN TERTIARY INSTITUTIONS

The engagement of AI in tertiary institutions brings about novel means of learning distinct from the traditional face-to-face method of learning. It has brought transformative beneficial changes, offering new avenues for accessibility in learning thereby facilitating and enhancing learning. However, for students with disabilities, leveraging AI tools present unique set of challenges which include the following:

1. Accessibility concerns

One of the primary challenges is that AI learning tools cannot be easily accessed by SWDs due to non-compatibility with assistive technologies, non-user interface design, and the non-availability of alternative modalities needed in an effective inclusive learning environment. For example, text-to-speech software might struggle with complex academic language, while voice recognition systems might not recognize speech patterns associated with certain disabilities. Several studies point to accessibility issues as a major hurdle. Research by Fichten et al. (2022) highlights that many AI-powered applications lack compatibility with some educational technology tools for SWDs such as screen readers. It is a major hurdle for visual and motor impaired students due to the limitation of their ability to engage with AI-powered learning platforms which create a significant learning barrier for them. Fichten et al. (2022) also found that while AI-powered mobile apps hold promise for students with ADHD (Attention-deficit/hyperactivity disorder); "they often lack compatibility with traditional assistive technologies such as screen readers" (Ebadi, & Farhangi, 2023). This creates a digital divide, excluding SWDs from the potential benefits of AI tools. Other, researchers have pointed out some challenges related to the compatibility of AI tools in educational technology (Kloos et al., 2019). Furthermore, issues with the user interface design of AI applications create barriers for some categories of SWDs (Rodríguez-Pereyra et al., 2020).

2. Predisposition in AI

AI learning tools may unintentionally continue prejudice with the usage by SWDs which thus affect them disproportionately. For example, facial recognition technologies may struggle to recognize individuals with certain physical disabilities. There is also the prevalence of algorithmic bias in the use of AI which does not ensure fair treatment and opportunities for all students and could disproportionately affect SWDs. AI algorithms are trained on vast datasets and these datasets can perpetuate unconscious bias which could disadvantage SWDs by presenting skewed information or underestimating their potentials.

However, Panjwani-Charani & Zhai (2023) emphasize the risk of data bias against SWDs by affirming that "if the training data perpetuates negative stereotypes or overlooks the diverse needs of SWDs, the resulting AI tools may exacerbate existing inequalities in areas like course recommendations or automated grading. Thus biases in the data can lead to discriminatory outcomes, such as unfair course recommendations or automated grading that disadvantage SWDs".

3. Limited customization options

Lack of customizable options in existing AI technologies remains a significant challenge. Some AI tools lack sufficient customization features to accommodate the diverse needs of students which need personalization—a characteristic feature of learning effectiveness for SWDs. Personalization is essential for tailoring learning experiences to specific requirements, such as adaptive interfaces, alternative input methods, or content modifications which some of the AI tools lack.

4. Cost and accessibility of AI devices

While AI devices can enhance learning experience, their cost may pose financial burden and accessibility to SWDs in higher education. The high cost of AI devices may limit the availability to students from low-income backgrounds or under-resourced educational institutions. However, not all educational institutions may have the resources to provide these devices hindering equal access to AI-powered tools. Nevertheless, "studies have discussed the economic difficulties encountered by SWDs and emphasized need for affordable and accessible assistive technologies" (Smith et al., 2017).

5. Limited scope

AI can provide valuable support but cannot replace the personalize guidance and emotional support offered by human educators. Studies by Ouherrou et al., 2019) support this limitation of AI and remark that "AI tools cannot fully address the social and emotional aspects of learning faced by many SWDs". However, SWDs may still require adaptations to traditional teaching methods of face-to-face to fully grasp concepts. Nevertheless, despite the fact that AI can be seen as a forceful educational technology tool, it cannot be a replacement for human interaction as SWDs may still require personalize support from lecturers, caregivers, and disability service providers.

6. Doubts and anxiety on AI's usage

AI's usage creates some doubts, causes anxiety and pose challenge to users due to the information produced by system not fully reliable and accurate.

7. Keeping information secret and safe

Artificial Intelligence gather and analyse information of students. This act is a source of worry to SWDs as they are sceptical on the possibility of such information being passed on to a third party without their consent which may restrict their usage of AI and thus hinder their learning.

8. Comfortableness

Comfortableness on AI's usage in learning pose some challenge to users. Such challenges include adaptableness, receptiveness, doubts about confidentiality and safety of received and stored personal information of students which may limit SWDs usage of Artificial intelligence in learning.

RECOMMENDATIONS

SWDs face unique challenges in higher education but advancements in artificial intelligence (AI) offer promising solutions to bridge these gaps and personalize learning experience. However, the paper has identified some difficulties in the use of AI in learning and it is pertinent they are addressed to enable SWDs benefit maximally from the usage. Therefore, the following suggestions should be considered:

1. Universal design for learning (UDL) principle is crucial for effective usage of AI by SWDs in learning as it ensures that educational materials and technologies are easily accessible and compatible to all students. Therefore, AI developers should produce AI tools with accessibility and compatibility to all categories of learners with disabilities, for example, screen readers should be easily accessible and compatible to visual impaired students. Also AI tools should be made to offer alternative input methods, provide clear and concise audio descriptions for students with visual impairment.
2. Some AI tools lack sufficient customization features to accommodate the unique needs of students with disabilities. AI manufacturers should note that personalization is essential for tailoring students learning experiences to specific requirements, such as adaptive interfaces, alternative input methods, or content modifications which some of the AI tools lack, and they should therefore modify these AI learning educational tools to accommodate the unique needs of SWDs depending on the type and degree of disabilities.
3. In the development and deployment of AI tools, it is essential to include individuals with disabilities in the decision making process because engagement with them

would assist in producing AI learning tools that would meet their diverse learning needs. This can be achieved through engagement with disabilities people's organizations by higher education administrators and producers of AI educational technologies.

4. Educators play pivotal role in facilitating the integration of AI into the learning environment. Providing ongoing training to lecturers, caregivers and SWDs on the effective use of AI tools would make them effective at the usage. Therefore, regular training should be provided by tertiary institutions for lecturers, caregivers and SWDs to enable them keep abreast with advances in AI technology that is novel and dynamic in nature.
5. Educators should promote the use of open-source AI solutions and interoperable platforms to foster the creation of customizable tools that can be adapted to meet the diverse needs of SWDs depending on the degree and type of disabilities.
6. Educational institutions should explore financial support options for SWDs to acquire AI devices and purchase data. Collaboration with technology companies, government agencies, and nongovernmental organizations can help secure resources and funds needed to ensure equal access to AI-powered tools.
7. Educators should take into consideration the bias nature of Al Algorithms which disproportionately affect the learning of SWDs. Researchers should come up with how this challenge can be addressed to ensure that the algorithms are fair representatives of diverse learning styles and abilities and meet the learning needs of SWDs.
8. Educators should integrate AI as a supplement, not a replacement, for human educators. Tertiary institutions should invest in disability services and ensure lecturers are equipped to leverage AI tools and tailor their teaching approaches to individual student's needs in ways that empower SWDs personalize their learning experience.
9. Transparency and fairness regarding data collection and usage of AI are essential for the usage by SWDs. Educational institutions should be transparent about the data used in AI technologies during teaching-learning process and actively seek diverse datasets to mitigate bias. There should be regular auditing and testing of these AI tools to ensure that they do not discriminate against SWDs.
10. Maintaining data privacy and security are important in protecting students' information from potential breaches or misuse in the use of AI because it can build SWDs trust and confidence in the usage. Therefore, educational institution should protect sensitive information of SWDs by ensuring complete compliance with data protection regulations which guarantee confidentiality in dealing with students' information.

CONCLUSION

Artificial Intelligence is radically changing learning experience in higher education by providing unique and unprecedented opportunities for inclusivity, personalize learning and a more robust accessible environment. However, by accepting the potentials of AI, higher education would foster an environment where all students in spite of their abilities acquire knowledge and skills and contribute meaningfully towards a heterogeneous and enriching academic community. Moreover, as regards SWDs, AI serves as a powerful tool in overcoming learning barriers by offering tailored assistance, providing innovative assistive technologies and improving learning experience. Nevertheless, the usage of AI technologies in higher institutions by SWDs is with some challenges as has been highlighted. Though, while blending of AI into tertiary institutions offers promising opportunities to SWDs, it is equally important to proffer solutions to these difficulties with regard to accessibility, bias, customization, and affordability amongst others. Notwithstanding, by addressing these challenges and implementing this contemplative suggestions, AI can become a powerful force in facilitating and enhancing SWDs learning experiences and in attaining mastery learning. However, it is hoped that lecturers in higher education would continue to use AI in teaching SWDs in conjunction with the traditional mode of face- to-face teaching and address the challenges that come with the usage to enable them benefit maximally from this novel and unique instructional technology for the sake of humanity.

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CONFLICT OF INTEREST STATEMENT

The author declares no conflicts of interest.

ETHICS STATEMENT

None.

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REFERENCES

Canadian University Survey Consortium. 2020. 2020 middle-years student survey: master report: June 2020. Retrieved from https://cusc-ccreu.ca/?download=823.

Canadian University Survey Consortium. 2021. Graduating student survey: master report: June 2021. Retrieved from https://cusc-ccreu.ca/?download=922.

Chiancone, S. 2023. Implementing AI in education: a narrative literature review. Retrieved from https://www.researchgate.net/publication/347448363_artificial_intelligence_in_education.

Copeland, B., J. 2023. Artificial intelligence. Encyclopaedia Britannica Retrieved from https://www.britannica.com/technology/artificial-intelligence.

Ebadi, N., & Farhangi, H 2023. Artificial intelligence in higher education: ethical concerns for students with disabilities. Retrieved from https://ceur-ws.org/Vol-3442/paper-37.pdf.

EDUCAUSE. 2023. 3 ways AI can help students with disabilities Retrieved from https://er.educause.edu/articles/2022/6/3-ways-ai-can-help-students-with-disbilities.

Fichten, C., S., Havel, A., King, L., Jorgensen, M., Budd, J., Asuncion, J., Nguyen, M. N., Amsel, R., & Marcil, E. 2018. Are you in or out? Canadian students who register for disability-related services in junior/community colleges versus those who do not. Journal of Education and Human Development, 7(1), 166–175. Retrieved from http://dx.doi.org/10.15640/jehd.v7n1a19.

Kloos, C. D., et al. (2019. Interactive visualization tools for deaf and hard-of-hearing students in introductory programming courses. Computers & Education, 132, 42-57.

Lynch. 2018. How AI is improving assistive technology. Retrieved from https://www.thetechedvocate.org/how-artificial-intelligence-is-improving-assistive-technology/.

Microsoft. (2019). Everyday AI in Microsoft 365. Retrieved from https://query.prod.cms.rt.microsoft.com/cms/api/am /binary/RE2AA0.

Naidu, S. 2006. E-Learning: a guidebook of principles, procedures and practices. Commonwealth Educational Media Center for Asia.

Ouherrou, R., Bouhnik, N., & El Idrissi, M. 2019. Emotional and social difficulties in students with learning disabilities: A systematic review. European Journal of Special Needs Education, 34(2), 180-202.

Panjwani-Charani, 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 Oxford University Press. Pp xx-xx Retrieved from https://www.researchgate.net/publication/37429569_all_for_students_with_disabilities_a_systematic_review.

Singh, M., & Rose, D. 2015. Universal design for learning in higher education: from principles to practice. Taylor & Francis.

Smith, D. L., et al. 2017. Education and disability. In A. C. Michalos (Ed.), Encyclopaedia of Quality of Life and Well-Being Research. Springer. pp. 1761-1765.

Springer Publishing Connect. 2023. Disability across the developmental lifespan, an introduction for the helping. Retrieved from

https://connect.springerpub.com/content/book/978-0-8261-3923-8/part/part01/chapter/ch01.

Srinivasa, N., & Bhatnagar, S. 2022. Artificial intelligence in education: a review of the literature. International Journal of Advanced Science and Technology, 149(7), 1232-1241.

US Department of Education. 2021. National Center for Education Statistics, Institute of Education Sciences, Postsecondary Education chapter 3 Digest of Education Statistics: 2019 NCES, IES, US Department of Education.

US Department of Education. 2022. Use of supports among students with disabilities and special needs in National Center for Education Statistics, Institute of Education Sciences (NCES, IES). Retrieved from https://nces.edu/gov/whatsnew/press_releases/4_26_2022.asp.

Zheng, B., Warschauer, M., & Hwang, W., Y. 2018. The effect of personalized adaptive learning: a comparative case study. Journal of Educational Computing Research, 56(6), 787–807.