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REVIEW

Artificial intelligence applications to improve accessibility in education for students with disabilities

Aplicaciones de inteligencia artificial para mejorar la accesibilidad en la educación de estudiantes con discapacidad

Javier Guaña-Moya[1], Yamileth Arteaga-Alcívar[2], Armando Tarco Sánchez[3], Mérida Marlleny Alatrista Gironzini[3]

[1]Pontificia Universidad Católica del Ecuador, Facultad de Hábitat, Infraestructura y Creatividad. Quito, Ecuador.
[2]Instituto Superior Universitario Japón, Unidad de Investigación. Quito, Ecuador.
[3]Universidad Nacional de San Antonio Abad del Cusco, Cusco, Perú.

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Corresponding author: Javier Guaña-Moya

ABSTRACT

Artificial intelligence is revolutionizing education, offering a range of possibilities for creating more accessible, inclusive and effective learning experiences for students with disabilities. In this systematic review, we were able to find several references to personalization of learning and assistive technologies for learning. Similarly, artificial intelligence has the potential to be a powerful tool for inclusive education, providing all students with the opportunities and support they need to reach their full potential, as well as the continued research on them serves to develop new tools and technologies that respond to the specific needs of each student. This research is articulated based on Kitchenham's systematic review, considering various research sources, such as academic journal articles and research papers with similar themes to the topic of this paper. Also, this review aims to identify the various tools with artificial intelligence that are found today to improve access to education for people with disabilities, concluding that there are multiple tools to facilitate access to people with disabilities, and that they are also used to improve the learning process of these people.

Keywords: Accessibility; Inclusion; People with Disabilities; Artificial Intelligence; Adaptability; Education.

RESUMEN

La inteligencia artificial está revolucionando la educación, ofreciendo un abanico de posibilidades para crear experiencias de aprendizaje más accesibles, inclusivas y efectivas para estudiantes con discapacidades. En esta revisión sistemática se logró encontrar algunas referentes a la personalización del aprendizaje y tecnologías de apoyo para el aprendizaje. De igual forma, la inteligencia artificial tiene el potencial de ser una herramienta poderosa para la educación inclusiva, brindando a todos los estudiantes las oportunidades y el apoyo que necesitan para alcanzar su máximo potencial, así como que la investigación continúa de las mismas sirve para desarrollar nuevas herramientas y tecnologías que respondan a las necesidades específicas de cada estudiante. Esta investigación se articula en base a la revisión sistemática de Kitchenham, tomando en cuenta varias fuentes de investigación, como artículos de revistas académicas y trabajos investigativos con temas similares al tema del presente documento. También, esta revisión se plantea como objetivo el identificar las diversas herramientas con inteligencia artificial que se encuentran hoy en día para mejorar la accesibilidad a la educación a personas con discapacidad, concluyendo que existen múltiples herramientas que pueden facilitar este mismo, y que también se emplean para mejorar el proceso de aprendizaje de estas

personas.

Palabras clave*:* Accesibilidad; Inclusión; Personas con Discapacidad; Inteligencia Artificial; Adaptabilidad; Educación.

INTRODUCTION

Artificial Intelligence (AI) has become a crucial tool for improving accessibility in education, particularly for students with disabilities. One area where AI has made significant progress is improving visual accessibility for people with visual impairments. Thanks to AI-based tools and applications, these people can now access and relate to visual content in ways that were previously unimaginable.

This technology offers innovative solutions that allow students to overcome barriers and access quality education, being useful in creating accessible educational materials through optical character recognition (OCR), which converts printed text into digital formats for screen readers or enlargement software, thus facilitating independent learning for visually impaired students.[1]

In addition, AI can personalize learning by tailoring the content and pace of teaching to individual student needs, which is crucial for those with physical and cognitive disabilities; technologies such as voice recognition and speech synthesis enable students with motor or speech disabilities to interact with educational content more effectively, promoting greater inclusion in the educational environment, demonstrating the transformative potential of AI to create a more inclusive educational environment for all students.[2]

AI is also evolving to assist students with cognitive disabilities in their learning process more efficiently. Some students face challenges in retaining information or understanding abstract concepts. AI can mitigate these problems by customizing learning to suit the needs of each student, using algorithms designed for this purpose, which can identify areas where a student needs support and offer specific suggestions and recommendations to facilitate the understanding of the material.[3]

It is worth noting, as indicated [4], that:

In the context of constant technological advancement, artificial intelligence has become a powerful tool in multiple sectors, including education. It is essential that technical and technological institutes in Ecuador fully capitalize on the advantages of AI to revolutionize the educational process and improve the quality of education. Since its launch on November 30, 2022, ChatGPT v3.0 has become one of the most requested applications in recent years, overloading their servers due to the large number of queries covering academic topics and scientific research. Its popularity has grown even more with version 4.0, released on March 14, 2023, which offers significantly improved and efficient capabilities compared to its predecessor.

However, it is essential to stress that the incorporation of artificial intelligence into education requires careful planning and adequate preparation for both teachers and students. Technology institutions must ensure that the use of AI is ethical and responsible, with a focus on protecting privacy and security of student data. An increase in the number of conferences focusing on the proper use and objectives of AI applications, highlighting ethical aspects, while emphasizing the importance of developing human intelligence as an essential component in implementing this emerging technology.

The active participation of students with disabilities in the process of AI integration is very much, as students should be educated on how to use these tools in an effective and ethical way.[5] This will not only allow them to make the most of the opportunities offered by AI but also foster a culture of responsibility and awareness about the use of technology.[6]

METHOD

The methodology used in this study follows the guidelines established by [7], to conduct a systematic literature review. The objective of applying these guidelines was to obtain relevant and relevant information in relation to the research questions formulated in this study. The steps defined in this regulation were strictly followed, thus allowing a systematic and structured process of data collection and analysis, which includes:

1. Planning for the review
2. The development of the review
3. The analysis of results.

Planning of the review

For the planning of the review, it is intended to conduct a comprehensive review that encompasses AI applications to improve accessibility in education for students with disabilities. The aim is to highlight how AI can become an essential element in facilitating learning and inclusion of these students in the educational

environment. Therefore, for the development of this research article the following research questions were raised:

Q1. What AI applications exist to improve accessibility in education for students with disabilities?

Q2. What are the specific AI tools and technologies that are used to support students with different types of disabilities?

Q3. How do students with disabilities benefit from the use of AI in education?

In addition, certain criteria for inclusion were considered in the selection of documents, mainly academic articles addressing issues related to the application of AI to improve accessibility in education for students with disabilities. Topics such as the importance of AI in creating accessible educational materials, the use of assistive technologies such as voice recognition and speech synthesis were discussed, and the impact of these technologies on the academic performance and social inclusion of students with disabilities. Search terms such as artificial intelligence, educational accessibility, assistive technologies, and inclusive education were used to identify relevant documents.[8]

Review process

In this section, a careful selection of articles is made, applying the previously established inclusion criteria, prioritizing those that presented the most important ideas and highlights in relation to the study topic. In making this selection, the abstracts and conclusions of the articles were considered, evaluating their contribution to the research questions posed.

Subsequently, it was possible to collect and select several research articles, with a total of 31 documents. However, of these only 27 met the requirements and were considered relevant to the investigation in question.

Analysis of results

The analysis was organized in such a way that each of the research questions raised in this study will be addressed, starting with the key words and main ideas set out in the introduction to the document.

Q1. ¿What AI applications exist to improve accessibility in education for students with disabilities?

Prior to information on AI applications to strengthen access to education for people with disabilities, it is worth mentioning the basis of artificial intelligence, which are Information and Communication Technologies (ICTs), which emerged as a wave of digital tools stemming from globalization and the absolute dependence of society on them.[9]

As mentioned [10], citing "Suriá, 2011" and "Rodríguez, Sánchez-Montoya y Soto, 2006", information and communication technologies (ICTs) also played a role in facilitating access to education for people with Special Educational Needs (SEN), meeting the following objectives:

- *Pedagogical and rehabilitative,* ICT allows development of a plan of individualized support for students with NEE.
- *Equal opportunities,* Information and Communication Technologies (ICT) seen as an auxiliary resource for the development of individuals with disabilities; students use them to develop their skills and teachers to improve teaching processes.
- In general, the main limitations and difficulties faced by students with SEN are diverse and can be summarized in the Improvement of Universal Accessibility, which includes the installation of ramps, signage and visual and tactile information, magnifying glasses, Adequate lighting and noise levels, adaptation of furniture and study areas, among others. Adaptation must be customized according to the degree and type of disability.

Similarly, AI serves the same purposes. However, unlike ICT, they are in a present boom, which has passed through a pandemic that made people generally more dependent on digital tools and platforms and, Therefore, the accessibility rate to people with SEN before this period was lower than at present.

In addition, by focusing on the benefits of AI to improve access for people with Special Educational Needs (SEN), more accessible and interactive virtual platforms can be developed that simplify educational processes for students, Teachers and administrators. In this regard, some institutions are adopting instructional design approaches, learning management systems (LMS), and artificial intelligence technology to facilitate real-time and deferred interaction with students.[11]

Similarly, through data analysis, AI can anticipate the possibility of a student continuing or dropping out of school and can track to motivate those at higher risk of leaving. Strategies such as adjusting assessment methods, increasing active practice, encouraging collaborative projects and establishing peer tutoring are examples of measures that can be taken according to specific circumstances. In addition, through data analysis and the use of advanced algorithms, artificial intelligence can customize educational materials, activities and

assessments according to individual needs and skills of each student. This approach allows students to progress at their own pace, promoting more effective and motivating learning. The relevance of curriculum applications and adjustments that AI can recommend addressing special educational needs, whether associated with disabilities, is highlighted, The Ministry of Education and Science has been responsible for the preparation of the curriculum. The responsibility of the educator is also to maintain the principles of inclusion and collaborative participation among all members of the educational community. Speech recognition technology and natural language processing can also be used to develop more accessible learning interfaces, allowing students with disabilities or language barriers to participate fully in the educational process.[4]

Consequently, establishing the applications of AI in education of students with disabilities should define a key concept for the development of this review question. Assistive Technology (AT), which includes the use of AI as a digital technology tool, which is defined in relation to persons with disabilities as referred to in [12]:

The term "Assistive Technologies" (AT) refers to devices or services used to mitigate functional limitations, promote independent living and enable older people and those with restrictions in their activities to reach their full potential. Even technologies not specifically designed for people with activity limitations can be adapted to help or support functions as needed. Technical equipment covers any type of equipment or service that meets this definition, such as wheelchairs, prostheses, communication devices and telecommunications services. In the field of digital inclusion, AT includes, for example, equipment and services designed to access information (such as vision, hearing, reading, writing), interpersonal communication and environment control.

On the other hand, it is worth defining the concept of disability, which, organizations such as the World Health Organization,[13] in its publication; "The International Classification of Functioning, Disability and Health (ICF)" or CIF for its acronym in Spanish, defines it as the interrelationship between a person's health status and environmental factors that affect their lifestyle. Thus, disability is conceived as the occurrence of negative aspects of the individual's interaction with its contextual factors, which leads to limitations in activity and barriers to participation.

From another perspective, "disability" is defined as any form of impediment or restriction that affects the normal functioning of an individual. Thus, "deterioration" refers to a decrease or weakening of normal functioning, and "limitation" implies a reduction in the usual activity. Thus, the limitation is understood as the various barriers that restrict learning and participation of students.[14]

With this conceptualization, it is already possible to establish and define the types of students with SEN and the types of disabilities they present. The following table lists some specific disabilities and their category, based on information provided by the National Institute of Educational Technologies and Teacher Training.[15]

Table 1. Types of General and Specific Disabilities

Disability	**Types**
Cognitive Disability	- Medium psychic
	- Light psychic
Auditory Disability	- Cophosis (total deafness)
	- Hypoacusis (partial deafness)
Visual Disability	- Legal blindness on Wecker scale (equal to or less than 1 degree)
	- Total blindness on Wecker scale (equal to or less than 10 degrees)
Physical or Motor Disability	- Cerebral palsy
	- Spina bifida
	- Muscular dystrophy
Developmental Disorder Disability	- Asperger syndrome
	- Rett syndrome
	- Autism
	- Childhood disintegrative disorder
Personality and Behavior Disorder Disability	- Severe personality disorder and severe conduct disorder
	- Attention Deficit Hyperactivity Disorder (ADHD)

Source: Prepared based on the information provided by [15]

Similarly, to place these types of disabilities within a local approach, we use as a basis, as shown in figure 1, the percentage of disabled people who are in the country until 2023, as recorded in the statistical data of the National Council for the Equality of Disabilities (CONADIS), provided by the Ministry of Public Health of Ecuador.

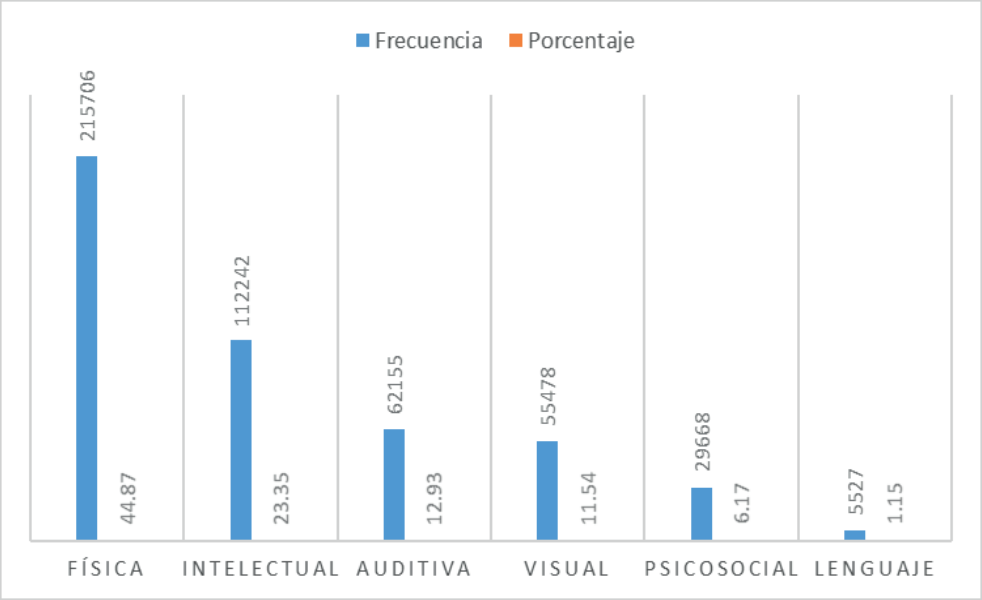

Figure 1. Type of disability

Note. Type of Disability, CONADIS-MSP, 2023. Available in: Disability Statistics - National Council for the Equality of Disabilities (consejodiscapacidades.gob.ec)

The figure shows the percentage of people according to type of disability, based on the total number of disabled persons registered in 2023 in Ecuador; physical disability is the most prevalent category, representing 45 % of the total, suggesting a significant need for assistive technologies such as screen readers and voice recognition software. Intellectual disability, at 23 %, can be addressed by adaptive learning platforms that adjust the content and pace of teaching. Students with hearing disabilities, who account for 13 %, can benefit from AI applications that use real-time voice recognition and transcription. Visually impaired students, who make up 12 per cent, benefit from text-to-speech and image recognition technologies. Psychosocial disability, which affects 6 % of students, can be addressed with mental health monitoring applications and collaborative platforms. Finally, language disability, with only 1 %, can be assisted by natural language recognition and generation and virtual assistants.

Therefore, for the development of the review, the most common disabilities are considered, being motor disability, visual and hearing, as well as autism and ADHD as disability due to disorder.

On the other hand, artificial intelligence (AI) has the potential to revolutionize education by making it more accessible and inclusive for students with disabilities. There are various AI applications that can be used for this purpose, which can be classified into the following categories as mentioned in [16]:

A) Virtual assistants and voice technology,[17]:

- Screen reading: Systems such as JAWS and NVDA, are programs that use speech synthesis technology to convert text on-screen into audio, allowing visually impaired students to access information and educational materials independently. These tools offer a variety of settings to customize the reading experience, such as reading speed, intonation and voice type.
- Voice recognition: Tools like Dragon NaturallySpeaking, which allows students with motor or writing difficulties to dictate texts, take notes and communicate more effectively. The software uses high-precision speech recognition algorithms to transcribe speech into text with a high degree of accuracy.
- Virtual Assistants: AI-powered chatbots, which function as conversational agents that can provide personalized support to students by answering questions, offering tutoring and helping them navigate online educational platforms. Chatbots can be integrated into LMS or run as standalone applications.

B) Adaptation of educational materials:

- Learning Personalization: Systems like Knewton and ALEKS, are adaptive learning systems that employ artificial intelligence algorithms to evaluate the individual student's performance in real time, identifying their strengths and areas for improvement. Based on this assessment, these systems personalize tasks and activities, adjusting the level of difficulty and providing immediate feedback.[18]
- Text Summary: Tools like Text Resumed are tools that use natural language processing (NLP) techniques to generate concise and accurate summaries of long texts. This can be particularly useful for students with reading difficulties or those who need to process large amounts of information.[19]

- Translation and transcription: Machine translation services, which are AI-driven and allow for the conversion of educational materials into different languages, eliminating barriers for students with hearing disabilities or coming from multilingual environments. This can improve understanding of concepts and facilitate participation in learning activities.[20]

C) Technologies for learning support:

- Writing tools: Applications like Grammarly and Ginger, these tools use NLP and machine learning algorithms to check spelling, grammar, syntax and word choice in written texts. This may be particularly useful for students with disabilities, writing difficulties or those learning a new language.[21]
- Virtual reality (VR) and augmented reality (AR): Refers to immersive learning environments, VR and AR, powered by AI, can create simulated, multi-sensory learning experiences that allow students to interact with virtual objects and scenarios. This may be particularly beneficial for students with special educational needs, such as some with autism or ADHD, as it can help improve their attention, motivation and participation in learning.[22]
- Intelligent tutoring systems: Customized virtual tutors, which can be used to develop intelligent tutoring systems that fit the individual needs of each student. These virtual tutors can provide real-time feedback, answer questions, offer personalized explanations and guide students through the learning process.[18]

D) Evaluation and feedback:

- Automatic grading: Automatic grading systems, these systems use AI algorithms to grade exams, assignments and other jobs automatically. This can free up time for teachers to focus on personalized interaction with students, providing more detailed and meaningful feedback.[23]
- Learning analysis: By analyzing educational data, artificial intelligence can examine large volumes of information such as grades, attendance records and class participation to identify patterns, problem areas and opportunities for improvement.[24] This information enables teachers to adjust their teaching strategies, provide individualized support for students and detect possible learning difficulties at an early stage. [25]
- Plagiarism detection: Tools like Turnitin use AI to compare texts with a large database of academic papers and other materials online. This enables teachers to identify potential cases of plagiarism and promote originality and integrity in student work.[26]

It is crucial to emphasize that the successful integration of AI into the education of students with disabilities requires careful planning, teacher training and consideration of ethical and data privacy aspects. AI should be used as a complementary tool to support learning, not as a replacement for human interaction and personalized attention by educators. Overall, AI applications in education offer great potential to break down learning barriers and create a more inclusive and accessible educational environment for all students regardless of their disabilities.

Q2. What are the specific AI tools and technologies that are used to support students with different types of disabilities?

To answer this question, it is necessary to specify also the disabilities or disorders that are targeted in the development of this research, being motor, visual and hearing disabilities, and the disorders; of the development “autism” and of the behavior “ADHD” is the word.

On the one hand, motor disability refers to any condition that impairs sensation, movement or coordination of limbs or body. These disabilities may be the result of congenital conditions, diseases, or physical trauma. The most common causes include spinal cord injury, cerebral palsy, muscular dystrophy, multiple sclerosis, spina bifida and amyotrophic lateral sclerosis (ALS). People with motor disabilities may face significant difficulties in manipulating a mouse or typing on a keyboard, which can limit their access to information online. However, assistive technologies such as adaptive keyboards, voice recognition devices and keyboard emulators exist that can help overcome these barriers.[27]

However, the causes of motor disability as indicated [28], are related to:When we refer to students with motor needs, we are talking about individuals who experience difficulties in the execution of movements, regardless of the underlying cause, which can be generalized, psychological or sensory. It is crucial to note that these motor disorders can affect various physical, speech, intellectual, social and educational aspects. Common causes of motor disorders include injuries or diseases of the nervous system, traumatic factors, metabolic factors, infections and genetic conditions, which may manifest at different stages of development. Motor problems tend to be more severe if the condition occurs during the intrauterine period. This allows classification of motor impairments according to their causes, level and extent of injury or deficit, such as

congenital encephalopathies, postnatal acquired encephalopathies, infections, congenital malformations and obstetric paralysis.

In turn, visual impairment covers both blindness and low vision. Refers to any level of vision loss that affects a person's ability to perform everyday tasks. Causes of visual impairment include glaucoma, cataracts, diabetic retinopathy, age-related macular degeneration, and eye lesions or infections. Visually impaired people can use assistive technologies such as screen readers, electronic magnifiers and braille devices to access information. In addition, it is crucial that web developers implement accessible design practices such as the use of alternative text for images and the development of user interfaces which are navigable via keyboard.[29]

Hearing impairment is defined as a decrease or total inability to hear. It may be congenital, develop over time, or be the result of injury or aging.

There are several types of hearing loss, including conductive hearing loss, sensorineural loss, mixed hearing loss and auditory neuropathy. Hearing impaired people can benefit from technologies such as hearing aids, cochlear implants, and magnetic loop systems. In the digital context, it is essential to provide transcriptions and subtitles for multimedia content, as well as ensuring that user interfaces are accessible to those using assistive technologies.[30]

Following the autism spectrum disorder (ASD), it is a neuro-developmental disorder characterized by deficits in social communication and the presence of restricted interests and repetitive behaviors. The prevalence of ASD has increased significantly in recent decades, from 1 in 69 in 2012 to 1 in 44 in 2018, according to the Centers for Disease Control and Prevention (CDC).[31] This increase can be attributed to changes in diagnostic criteria and increased awareness and detection of the disorder.

The diagnosis of ASD usually begins with an assessment of development, followed by a reference for a definitive diagnosis. Screening for medical comorbidities is crucial, as individuals with ASD often have additional conditions that may affect their overall well-being. Early intervention and personalized approaches are key to improving outcomes in individuals with ASD.[32]

Finally, Attention Deficit Hyperactivity Disorder or ADHD is one of the most common neurobehavioral disorders in childhood and adolescence, with a prevalence of more than 5 %.[33] ADHD is characterized by symptoms of inattention, hyperactivity and impulsiveness that interfere with daily functioning. Despite the large number of ADHD research in the last two decades, no valid neurobiological markers have yet been identified that would allow an unequivocal diagnostic classification.[34]

ASD and ADHD are both complex neurodevelopmental disorders that require a multidisciplinary approach to diagnosis and treatment. Continued research in genetics, neuroimaging and neurobiology is crucial to improving our understanding of these disorders and developing more effective interventions.

However, these disorders as well as disabilities do not make people who have them unable to lead a good academic life, which is why there are some AI applications specific to these types of disorders. For this purpose, a table is used in which the most relevant applications are shown, as well as their function in relation to the disability presented by students with NEE.

Table 2. Specific AI tools for learning people with disabilities

Category	Type		Application	Function
Virtual Assistance and Voice Technology	Screen reading	Software	- JAWS - NVDA - Voice Dream Reader - Claro Text	Text-to-speech, voice recognition, image description, speed adjustment and voice tone.[35]
	Voice recognition	Software	- Dragon NaturallySpeaking - Google Speech-to-Text - Microsoft Dictation	Dictation, device control, note taking, language translation.
	Virtual assistants	Digital tool	- Siri - Alexa - Google Assistant	Answering questions, providing support on tasks, remembering appointments, managing calendars.
Adaptation of teaching resources	Personalization of learning	Virtual platform	- Knewton - ALEKS - Khan Academy - iLearn	Adaptation of the level of difficulty, generation of customized exercises, immediate feedback.
	Summary of texts	Digital tool	- Resumidor De Textos - SSummarizer - Readability	Generation of concise summaries, identification of key ideas, simplification of complex texts.
	Translation and transcription	Service	- Google Translate - Microsoft Translator - DeepL Translate - Rev	Translation of texts and audio into multiple languages, transcription from audio to text.

Technologies for learning support	Writing tools	Software	- Grammarly - Ginger - LanguageTool - ProWritingAid	Spelling, grammar and style check, suggestions for improvement, plagiarism detection.
	VR and AR	Virtual platform	- Google Expeditions - CoSpaces Edu - zSpace	Immersive simulations, interactive experiences, experiential learning.
	Intelligent mentoring system	Digital tool	- Carnegie Learning - ASSISTments - MATHia - iTutor	Personalized mentoring, real-time feedback, adaptation to the learning rhythm.
Evaluation and feedback	Automatic rating	Virtual platform	- ETS AutoScore - Gradescope - Noodle Analytics - eRubric	Rapid and accurate grading of examinations, assignments and questionnaires.
	Analysis of learning	Software	- EdX Insights - Knewton Analytics - SAS Visual Analytics - Tableau	Analysis of learning data, identification of patterns, detection of areas of difficulty.
	Detection of plagiarism	Digital tool	- Turnitin - Urkund - Plagiarism Checker X - Unicheck	Comparison of texts with databases, detection of similarities, prevention of plagiarism.

AI offers great potential for improving accessibility and inclusion in education, providing students with disabilities with the tools and support they need to reach their full potential. By combining these tools with inclusive teaching approaches and appropriate teacher training, we can create an educational environment that empowers all students to learn and thrive.

Q3. ¿ How do students with disabilities benefit from the use of AI in education?

There are research and systematic reviews that have in common results on what are the benefits of AI in education for students with disabilities, among these are the perception of inclusion, greater accessibility to educational institutions, improvement in the learning process that connects with improved teaching process, greater autonomy and independence, improved social interaction skills, and better academic participation and motivation.[21]

There is no doubt that AI has a fundamental potential to positively enhance the lives of people with disabilities. However, a deeper analysis reveals that AI is not an objective and neutral technology; therefore, it is essential to examine, modulate and neutralize any harmful implication that may have and that may negatively affect human rights. This is the UN approach to the rights of people with disabilities, as outlined in its report to the Human Rights Council.[36] The report contains an analysis on artificial intelligence and the rights of people with disabilities, which effectively summarizes the main concerns that have emerged from this new situation.[37] This analysis shares similar views to other studies in the field, the most relevant conclusions will be mentioned throughout these pages.

On the other hand, research such as [38], mentions some opportunities that AI generates for people with disabilities:

- Ability to drive sustainable development, bringing both direct and indirect benefits to people with disabilities.
- Artificial intelligence systems play a crucial role in advancing assistive technologies, for example by promoting the personal mobility rights of people with visual disabilities through advanced navigation tools. Similarly, the development of eye tracking and voice recognition technologies provides essential accessibility resources for hearing-impaired individuals, whereas voice input systems are valuable for those who face difficulties in using traditional hand-held input devices.[39] These AI tools and systems enable people with disabilities to communicate, transmit information and access education.
- Adaptive learning platforms open vast possibilities for the educational personalization of students with disabilities, broadening their access to training. Through the use of tools such as individualized tutoring and creative games, these platforms support social skills development and problem solving. In addition, voice-to-text programs improve communication for people with speech difficulties by eliminating the need for interpreters, whereas avatars using sign language are extremely useful for those with hearing disabilities.
- Artificial intelligence applications in the field of mental health, disease diagnosis and rehabilitation

are equally important.

- Emerging technologies also have the potential to significantly promote the independent living of people with disabilities by incorporating robots and other AI-based tools into the home environment to provide care and assistance. The UN stresses that access to technology is essential for achieving full and equal participation of this group.[36]

Technology, and in particular artificial intelligence, plays an important role in improving accessibility and inclusion, significantly impacting the daily lives of people with disabilities. These tools not only optimize social communication and interactions, but also enhance mobility, autonomy in daily life and access to services comparable to those available to the rest of the population. Its applications are prominent in areas such as decision making, health care and rehabilitation services, and are intrinsically linked to the academic performance of people with disabilities.

CONCLUSIONS

Artificial intelligence (AI) has significant potential to improve the lives of people with disabilities by facilitating their inclusion and participation in various areas, especially education. AI applications can personalize learning, tailoring materials and activities to each student's specific needs, allowing for progress at their own pace and more effective and motivating learning. Technologies such as voice recognition, eye tracking and navigation systems are examples of how AI can provide crucial support tools for students with motor, visual and hearing disabilities.

However, the integration of artificial intelligence into education and other sectors must be carried out with rigorous planning and adequate training for both teachers and students. It is critical that technology institutions ensure ethical and responsible use of AI, protecting the privacy and security of student data. Cooperation between technology developers, education policy makers, researchers and school communities are essential to design and implement AI solutions that effectively meet the needs of students and educators. Furthermore, it is crucial to recognize that AI is not a completely objective or neutral technology. Any potential negative impact that might compromise human rights needs to be analyzed, adjusted and mitigated. In this regard, the UN Special Rapporteur on the rights of people with disabilities stresses the importance of adopting an ethical and responsible approach to the implementation of artificial intelligence.

AI-based assistive technologies, such as screen readers, electronic magnifiers and braille devices, are essential to improving accessibility for visually impaired students. Similarly, adaptive learning platforms and speech-to-text programs facilitate the education of students with hearing and speech disabilities. These tools not only improve accessibility but also promote greater autonomy and participation in the educational environment.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Javier Guaña-Moya, Yamileth Arteaga-Alcívar.

Data curation: Javier Guaña-Moya, Armando Tarco Sánchez, Mérida Marlleny Alatrista Gironzini.

Formal analysis: Yamileth Arteaga-Alcívar, Javier Guaña-Moya, Armando Tarco Sánchez, Mérida Marlleny Alatrista Gironzini.

Research: Javier Guaña-Moya, Yamileth Arteaga-Alcívar.

Methodology: Yamileth Arteaga-Alcívar, Javier Guaña-Moya.

Writing - original draft: Javier Guaña-Moya, Yamileth Arteaga-Alcívar, Armando Tarco Sánchez, Mérida Marlleny Alatrista Gironzini.

Writing - review and editing: Javier Guaña-Moya, Yamileth Arteaga-Alcívar.