Inclusive AI-based Education Scenarios

Handbook for Higher Education Teachers

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Preface

The application of artificial intelligence (AI) in the educational process for students with disabilities is important because it offers personalized, adaptive, and accessible learning experiences that traditional methods often cannot provide. AI tools can adjust content to individual needs, give real-time feedback, and support multiple modes of communication such as speech, text, and visual aids. This flexibility helps overcome barriers related to reading, writing, attention, or mobility, enabling students to engage more fully in the learning process. AI also assists teachers by identifying learning difficulties early, tracking progress, and suggesting tailored interventions, which improves the effectiveness of Individualized Education Programs (IEPs). Ultimately, AI promotes inclusion, independence, and equal opportunities, empowering students with disabilities to reach their potential in both academic and social contexts. In total 16 scenarios are developed in the frames of INEDU project.

The target group includes teachers, special educators, and trainers in primary, secondary, and vocational education and higher education who work with students with motor disabilities. These professionals support learners with conditions such as cerebral palsy, muscular dystrophy, spinal cord injuries, or limb differences that limit fine or etc. gross motor skills. They may teach in inclusive classrooms, special education settings, or assistive technology labs. This group requires knowledge of AI tools that enable accessibility—voice recognition, predictive text, and adaptive devices—and how to integrate them into teaching strategies. They need training to evaluate students' needs, select appropriate AI solutions, and design differentiated instruction that minimizes physical barriers. They also play a crucial role in guiding students in using these tools effectively to achieve independence, engagement, and academic success.

Basic Skills Important for teachers and trainers for scenarios Implementation:

Digital Literacy and AI Awareness:

- Understanding how AI tools like speech-to-text and etc. adaptive learning platform's function.
- Ability to navigate software interfaces, install and configure assistive technologies, and manage updates.

Assistive Technology Knowledge:

- Familiarity with a range of assistive devices (e.g., voice recognition systems, switch-access software).
- Basic troubleshooting skills to support students in real-time when technical issues arise.

Universal Design for Learning (UDL) Competence:

- Ability to design flexible lesson plans that accommodate multiple means of representation, engagement, and expression.
- Skill in adapting traditional activities to leverage AI tools for students with motor impairments.

Communication and Instructional Skills:

- Proficiency in providing clear, scaffolded instructions for students to use AI tools independently.
- Ability to coach students on voice commands, alternative input methods, and adaptive workflows.

Collaboration and Teamwork:

- Working effectively with multidisciplinary teams (therapists, IT staff, families) to select appropriate tools and align them with Individualized Education Plans (IEPs).

Ethical and Data Privacy Awareness:

- Understanding data protection, consent, and ethical implications of using AI in education.
- Ensuring that students' personal and learning data are handled responsibly.

Assessment and Monitoring Skills:

- Ability to use AI-generated analytics to monitor student engagement and progress.
- Adjusting teaching strategies and tools based on student feedback and performance data.

These scenarios empower educators and trainers with the knowledge, skills, and pedagogical strategies to effectively integrate AI tools that support students with motor disabilities. It begins with an overview of assistive AI—such as voice recognition, eye-tracking, gesture recognition, and adaptive robotics—grounded in Universal Design for Learning principles (Drolshagen et al. 2024). Modules include: needs assessment and IEP integration; features, configuration, and troubleshooting of specific AI systems; classroom implementation strategies; data privacy, ethics, and bias mitigation; and methods for ongoing evaluation of student progress.

Trainers learn to use adaptive learning platforms and Intelligent Tutoring Systems to personalize motor skill interventions. They engage in hands-on workshops with real-world AI assistive devices—such as sEMG gesture gloves and speech-to-text systems—using evidence-based scaffolding methods drawn from reinforcement earning studies on motor teaching [xx] Educators also explore robotics in special education, understanding both its benefits and implementation challenges. Finally, practical guidance is provided for building inclusive communities of practice and planning for sustainable adoption.

SCENARIO 1. The scenario **"Chatbots implementation and integration Scenario Supporting Students with Motor Disabilities"** is discussed by Kaunas University of Technology (KTU) researchers. The scenario is intended for teachers and trainers to help them on working with his scenario explores how artificial intelligence (AI) tools can empower students with motor disabilities to participate fully in educational activities. Motor disabilities, such as cerebral palsy, muscular dystrophy, or spinal cord injuries, often limit a student's ability to write, use keyboards, or interact with traditional learning materials. AI-powered assistive technologies - like speech-totext systems, predictive text applications, and intelligent tutoring systems - help overcome these barriers by enabling hands-free communication, navigation, and learning. The scenario highlights practical ways teachers and trainers can integrate these tools into inclusive classrooms, using Universal Design for Learning (UDL) principles to ensure accessibility. It also emphasizes the role of educators in assessing student needs, selecting appropriate AI solutions, and providing guidance and support to develop independent learning skills. This approach promotes equity, engagement, and academic success for students with diverse physical abilities.

SCENARIO 2. The scenario **"Text-to-speech and speech-to-text software "** is discussed by Kaunas University of Technology (KTU) researchers. The scenario "Diagnostic, Monitoring, & Intervention Systems" is discussed by Kaunas University of Technology researchers. Beyond instruction, AI can play a role in early diagnosis and ongoing monitoring of disabilities. Machine learning applied to speech patterns, handwriting, response time, errors in reading or math tasks can flag anomalies that suggest dyslexia, processing disorders, or other special educational needs. Furthermore, intervention systems (games, augmented reality, LLM-based tools) can deliver repeated practice, social or emotional skills training, or executive function coaching, with real-time metrics so that teachers and specialists can adapt the IEPs. Voultsiou, E., &

Moussiades, L. (2025). Presented a systematic review of AI, VR, and large language model (LLM) applications for special education shows that these technologies are especially valuable in cognitive development, social engagement, and personalized learning for students with special educational needs and disabilities.

SCENARIO 3. The scenario **"Voice Assistants & Conversational Interfaces"** is discussed by Kaunas University of Technology (KTU) researchers. The scenario "Accessibility Infrastructure, Inclusive Assessments & Ethical Considerations" is discussed by Kaunas University of Technology researchers. To truly realize inclusive education, AI must be embedded into the infrastructure: accessible materials (audio, captioning, image descriptions), sign language avatars or interfaces, flexible display and control settings. AI-driven assessment tools can offer multiple means of expression (respond by speech, picture, gesture) so that students can demonstrate competence regardless of disabilities that hamper reading or writing. At the same time, the ethical, privacy, fairness, and bias issues must be addressed. For instance, datasets for speech recognition often underrepresent non-standard speech or disabled voices; AI models may misinterpret or fail to recognize atypical accents or articulation; structural inequities in access to devices and internet affect implementation. Professionals emphasise participatory design — involving students with disabilities, caregivers, teachers — and grounding AI interventions in frameworks of rights and capability to ensure technology supports rather than marginalizes

SCENARIO 4. The scenario **"Educational platforms with AI functionalities"** is discussed by Kaunas University of Technology (KTU) researchers. To truly realize inclusive education, AI must be embedded into the infrastructure: accessible materials (audio, captioning, image descriptions), sign language avatars or interfaces, flexible display and control settings. AI-driven assessment tools can offer multiple means of expression (respond by speech, picture, gesture) so that students can demonstrate competence regardless of disabilities that hamper reading or writing. At the same time, the ethical, privacy, fairness, and bias issues must be addressed. For instance, datasets for speech recognition often underrepresent non-standard speech or disabled voices; AI models may misinterpret or fail to recognize atypical accents or articulation; structural inequities in access to devices and internet affect implementation. Professionals emphasise participatory design — involving students with disabilities, caregivers, teachers — and grounding AI interventions in frameworks of rights and capability to ensure technology supports rather than marginalizes (Melo-López et al. 2025).

SCENARIO 5. The scenario **"Screen readers converting text to speech or Braille"** is discussed by University of Bayreuth (UBT) researchers. Automatic sign language translation systems are among the most innovative applications of artificial intelligence in inclusive higher education. These technologies aim to bridge the communication gap between deaf or hard of hearing students and the academic environment by converting sign language into written or spoken text, and vice versa. Using a combination of computer vision, natural language processing (NLP) and machine learning, these systems analyse hand gestures, facial expressions and body movements in real time to produce accurate translations. In a university setting, these AI-powered tools can enhance lectures, online courses, and administrative interactions by offering instant access to spoken communication and empowering students to fluently express themselves in sign language. They reduce reliance on human interpreters and promote autonomy, inclusivity and equal participation in academic life. As this technology continues to evolve, automatic sign language translation systems have the potential to become a cornerstone of accessible education within multilingual and multicultural academic environments. The integration of such technologies aligns with the European Accessibility Act and universities' commitments to inclusive education, enabling all learners to engage with academic content on an equal footing.

SCENARIO 6. The scenario **"Systems for automatic sign language translation into text and vice versa"** is discussed by University of Bayreuth (UBT) researchers. Automatic sign language translation systems are a significant step towards fully including deaf and hard of hearing students in higher education. These AI-driven solutions use computer vision and natural language processing (NLP) alongside deep learning to recognise and interpret sign language gestures, translating them into text or speech – and vice versa. By processing visual inputs such as hand movements, facial expressions and body posture, these systems facilitate real-time bilingual communication between sign language users and hearing individuals. In a university setting, these technologies can transform classroom communication, administrative interactions and online learning experiences. They can provide an immediate translation of lectures, support hybrid or remote participation, and facilitate access to academic content, reducing the need for constant human interpretation. AI-based systems are helping to bridge communication gaps and empower students to engage independently in discussions and academic life. While these tools are still evolving, they demonstrate how artificial intelligence

can contribute to accessibility, language inclusion, and universal participation in higher education, thereby aligning with the broader goals of the UN Convention on the Rights of Persons with Disabilities and the European Accessibility Act.

SCENARIO 7. The scenario **"Image magnification software"** is discussed by University of Bayreuth (UBT) researchers. Image magnification software is crucial in ensuring equal access to digital learning environments for students with visual impairments or low vision. These AI-assisted tools enlarge and enhance on-screen content, such as text, graphics and interfaces, allowing users to perceive details that would otherwise be inaccessible. Modern magnification systems offer more than just simple zooming, employing artificial intelligence to enhance images, optimise contrast and provide adaptive colour filtering that dynamically adjusts to user preferences and visual conditions. In higher education, this software enables students to navigate digital learning platforms independently, read academic materials, participate in virtual laboratories and complete assessments. Integrating such software into institutional IT infrastructure supports compliance with accessibility standards (EN 301 549 and WCAG 2.2, https://www.etsi.org/deliver/etsi_en/301500_301599/301549/03.02.01_60/en_301549v030201p.pdf, https://www.w3.org/TR/WCAG22/), and promotes inclusive teaching practices. As AI-based magnification tools become more sophisticated, utilising machine learning to identify and emphasise essential visual elements, they bridge the gap between usability and accessibility. This empowers students with visual impairments or low vision to engage with complex academic content on an equal footing with their peers.

SCENARIO 8. The scenario **"Audio description applications"** is discussed by University of Bayreuth (UBT) researchers. Audio description (AD) applications are AI-driven tools that translate visual information into spoken narration. This allows individuals with visual impairments to perceive and understand visual media such as videos, presentations and educational materials. In higher education, these tools are crucial for improving accessibility by describing visual elements, such as charts, gestures, images, and scenes, in real time or as pre-recorded narration. Modern AI-based systems use a combination of computer vision, natural language processing (NLP) and speech synthesis to automatically identify and describe key visual components. This technology is being integrated into an increasing number of learning management systems, video conferencing platforms, and digital libraries, helping universities to comply with accessibility standards such as WCAG 2.1 and the EU Web Accessibility Directive. By transforming visual

learning into multisensory experiences, audio description applications enable students with visual impairments to participate in lectures, e-learning modules, and multimedia projects alongside their peers.

SCENARIO 9. The scenario **"Time and task management applications"** is discussed by the Pontifical University of John Paul II (UPJP2) researchers. Time and task management are fundamental skills for academic and professional success, especially given the increasing competitive pressures and complexity of modern life, which often translate into student mental health issues such as depression, anxiety, and stress (Hoeflich et al., 2023). Therefore, focusing on psychological education and improving students' mental well-being is crucial. In this context, traditional scheduling applications are evolving, giving way to advanced artificial intelligence (AI)-based tools that offer not only simple organizational functions but also personalized support (Lin et al., 2024; Paglialunga & Melogno, 2025), reducing cognitive load (Benitez Amaya et al., 2024), and increasing autonomy (Esquivel et al., 2024). Research shows that integrating AI tools into educational environments has the potential to promote inclusiveness and accessibility of learning for a diverse group of students (Lin et al., 2024; Melo-López et al., 2025).

SCENARIO 10. The scenario **"Platforms with adaptive learning features"** is discussed by the Pontifical University of John Paul II (UPJP2) researchers. Students with mental health disabilities often experience anxiety, stress, difficulty concentrating, memory, slow reaction time, and difficulty organizing tasks in educational settings. Traditional forms of education often prove insufficient because they lack personalization and the ability to respond in real time to students' dynamically changing mental states (Hao et al., 2025). In response to these challenges, platforms utilizing adaptive learning systems (ADAS), based on AI and intelligent tutoring systems (ITS), provide innovative support. AI offers the ability to deliver personalized and tailored learning strategies, which is fundamental to the process of inclusivity. These platforms can dynamically modify educational content, the pace of learning, and the format of delivery based on individual student needs, which is particularly valuable for individuals with mental health disorders (Paglialunga & Melogno, 2025).

SCENARIO 11. The scenario **"Tools for automatic note-taking"** is discussed by the Pontifical University of John Paul II (UPJP2) researchers. Given the specific learning challenges faced by

students with mental health conditions (e.g., difficulty concentrating, memory problems, slow reaction time), traditional manual note-taking methods are becoming increasingly challenging. AI-based tools offering automatic transcription and summarization functions are becoming key assistive technologies that positively impact well-being and increase student independence and engagement (Elrefaei et al., 2025; Esquivel et al., 2024). Automated note-taking tools (e.g., ChatGPT, Claude AI) act as personalized assistants, helping to transcribe lecture recordings, isolate key points, and generate notes. These features are extremely valuable for students with mental health conditions, allowing them to more easily absorb content without the constant burden of simultaneously listening, processing, and physically recording information.

SCENARIO 12. The scenario **"Applications supporting everyday activities"** is discussed by the Pontifical University of John Paul II (UPJP2) researchers. Students with mental health disorders experience numerous difficulties in their daily academic lives, which impact their cognitive, emotional, and social functioning. In academics, they often experience problems with concentration, memory, and organization, which makes it difficult to effectively learn material and complete tasks in a timely manner (Jukiewicz, 2025). Symptoms of mental health disorders, such as depression or anxiety disorders, can lead to decreased motivation, difficulty with punctuality, and irregular class attendance. Organizational difficulties related to maintaining a daily routine, meeting deadlines, and meeting basic life needs are also common, especially during periods of symptom flare. Modern technologies increasingly offer applications that effectively support the organization of everyday academic life, in addition to learning tools (e.g., planners, reminders, time management, mental health, and communication apps). For students with mental health issues, such solutions can provide significant support in self-regulation, motivation, and maintaining a daily rhythm. However, the effectiveness of these technologies depends largely on the conscious and empathetic role of the teacher, who helps students incorporate these tools into the learning process in a balanced and safe manner.

SCENARIO 13. The scenario **"Chatbots supporting social communication"** is discussed by Florida University (FU) researchers. Individuals with ASD will exhibit alterations in communication and social interaction, which manifest as difficulties in socio-emotional reciprocity. These behaviors range, for example, from displaying unusual social approaches and problems maintaining the normal back-and-forth flow of conversations, to a reduced willingness to share interests, emotions, and affection, and even a failure to initiate or respond to social interaction (Paul &

Wilson, 2009). Another consistently present characteristic relates to problems understanding nonverbal communication, and therefore, understanding the social environment. They show difficulty being sensitive to social reinforcement, as well as sharing objects, activities, or moments of enjoyment, and exhibit little engagement in group activities, which typically cause them discomfort and stress. In most individuals with ASD, a lack of integration between verbal and nonverbal communication is observed, giving the impression of being scattered or having attention deficits, when the real cause is difficulty with joint attention, a failure to perceive the need to attend to what others are attending to, and a failure to recognize what is important, focusing instead on any insignificant element of the context (Barrios et al., 2019).

SCENARIO 14. The scenario **"AI tools for personalized progress monitoring and social/communication skills support therapy"** is discussed by Florida University (FU) researchers. People with autism exhibit difficulties developing, maintaining, and understanding relationships, which can range from problems adjusting their behavior in different social contexts and difficulties sharing imaginative play or making friends, to, at the extreme, a lack of interest in other people (APA, 2013, 2022). Therefore, difficulty establishing appropriate social relationships is one of the defining characteristics of ASD. Thus, people with ASD typically show little to no spontaneity in initiating social contact or making requests (as if they were unaware that they should). Furthermore, they demonstrate less intention or initiative to initiate approaches and communicative exchanges with others, especially their peers. They also exhibit difficulties adjusting their behavior to fit into different social contexts, since the set of social relationships is governed by subtle, implicit norms and conventions, full of exceptions and conditions depending on the context—norms that are learned through trial and error. This lack of awareness of social norms in individuals with ASD often leads to behaviour that is inappropriate in each social context (Barrios et al., 2019).

SCENARIO 15. The scenario **"Real-time transcription apps (*Otter.ai*)"** is discussed by Florida University (FU) researchers. Sustained attention is the ability to remain focused on a task or stimulus for an extended period of time. In the context of Autism Spectrum Disorder (ASD), this attentional function is often affected, although to varying degrees depending on age, cognitive level, and comorbidity with other disorders such as Attention Deficit Hyperactivity Disorder (ADHD). Many children with ASD can hyperfocus on restricted stimuli, showing great attention to topics of personal interest, but have difficulty maintaining attention on unmotivating tasks.

Students with ASD can demonstrate excellent levels of sustained attention on tasks they find rewarding or motivating. However, when faced with schoolwork, social situations, or less appealing activities, they may exhibit low resistance to distraction and have difficulty inhibiting or withdrawing their attention from irrelevant stimuli (such as ambient noise). Given their vulnerability to distractions, even though they can concentrate intensely on their interests, they can be easily distracted by irrelevant external stimuli when the task is not inherently engaging (Barrios et al., 2019; Demetriu et al., 2019).

SCENARIO 16. The scenario **"Tools assisting in note-taking and organization (*Glean*)"** is discussed by Florida University (FU) researchers. Executive functions (EF) are internally self-directed cognitive skills used to achieve a goal. This set of higher cognitive abilities, which allows us to plan, organize, regulate, and monitor behaviour to achieve objectives, includes *planning*, or the ordering of our actions to achieve a goal; *organization*, which consists of structuring information and activities; *inhibitory control*, or the restraint of impulsive or inappropriate responses; and *cognitive flexibility*, as the ability to adapt to changes or new situations, among others.In relation to this, the behaviour and thinking of people with ASD is characterized by inflexibility and rigidity, visible in the presence of repetitive behaviours and interests, and also manifesting itself in the processes of decision-making, or in the planning, organization and problem-solving, which allows anticipating difficulties and organizing time effectively (Barrios et al., 2019).

Putting these scenarios together, the application of AI in education for students with disabilities offers tremendous promise: improving personalization, early detection, autonomy, accessibility, and inclusion. But to deliver on this promise, there must be: rigorous evidence (with strong methodology), transparent and fair AI models, attention to infrastructure and training, participatory design, and ethical oversight. Schools should integrate AI tools in a way that complements teacher expertise, not replaces it. Follow all 16 scenarios in the document bellow.

I. AI Tools Supporting Students with Motor Disabilities

Introduction to the Topic I

The application of artificial intelligence (AI) in the educational process for students with disabilities is important because it offers personalized, adaptive, and accessible learning experiences that traditional methods often cannot provide. AI tools can adjust content to individual needs, give real-time feedback, and support multiple modes of communication such as speech, text, and visual aids. This flexibility helps overcome barriers related to reading, writing, attention, or mobility, enabling students to engage more fully in the learning process. AI also assists teachers by identifying learning difficulties early, tracking progress, and suggesting tailored interventions, which improves the effectiveness of Individualized Education Programs (IEPs). Ultimately, AI promotes inclusion, independence, and equal opportunities, empowering students with disabilities to reach their potential in both academic and social contexts. We have implemented for this topic 4 scenarios. Follow the scenarios bellow.

SCENARIO 1. Chatbots implementation and integration Scenario Supporting Students with Motor Disabilities

Introduction to the Scenario

The scenario is intended for teachers and trainers to help them on working with his scenario explores how artificial intelligence (AI) tools can empower students with motor disabilities to participate fully in educational activities. Motor disabilities, such as cerebral palsy, muscular dystrophy, or spinal cord injuries, often limit a student's ability to write, use keyboards, or interact with traditional learning materials. AI-powered assistive technologies - like speech-to-text systems, predictive text applications, and intelligent tutoring systems - help overcome these barriers by enabling hands-free communication, navigation, and learning.

The scenario highlights practical ways teachers and trainers can integrate these tools into inclusive classrooms, using Universal Design for Learning (UDL) principles to ensure accessibility. It also emphasizes the role of educators in assessing student needs, selecting appropriate AI solutions, and providing guidance and support to develop independent learning skills. This approach promotes equity, engagement, and academic success for students with diverse physical abilities.

The aim of the Scenario

The aim of the scenario is to gain skills and competences on chatbots integration into practice.

Learners will be able to select AI Tools Supporting Students with Motor Disabilities and to integrate into practice by working with students

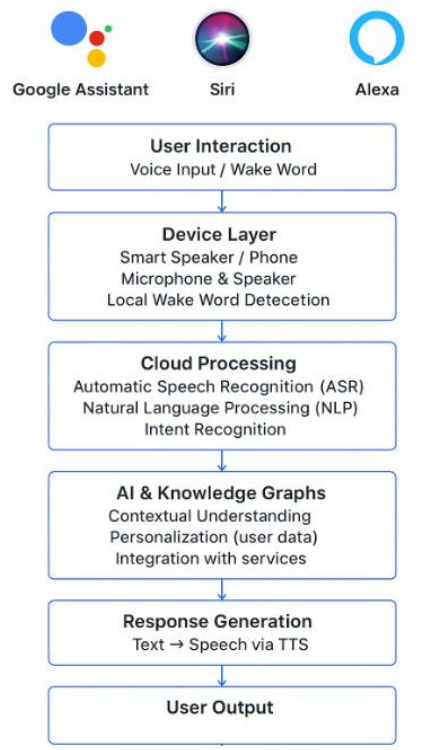
AI Tool(s) Description

We discuss about five chatbot/AI-agent tools designed to support students with motor disabilities, enabling hands-free interaction, communication assistance, and inclusive learning:

1. Google Assistant / Apple Siri / Amazon Alexa

Type:	Voice-activated virtual assistants

Support Provided:	– Students can verbally dictate notes, send messages, search the web, and control accessibility settings—eliminating the need for physical interaction with keyboards or touchscreens. – Integrates with calendars and reminders to aid in task management. – Source & Evidence: listed among top AI voice assistants supporting hands-free learning for students with motor impairments.



Google Assistant, Siri, and Alexa are leading voice-controlled intelligent assistants designed to simplify everyday interactions with technology. Google Assistant, developed by Google, excels in search accuracy and cross-platform integration. Siri, created by Apple, focuses on privacy and seamless operation within Apple's closed ecosystem. Alexa, built by Amazon, is known for its extensive smart-home support and customizable skills. All three-offer voice recognition, task automation, and device management. Usage is generally free, with licensing tied to devices that include each assistant, enabling users to access services, control environments, and receive real-time assistance.

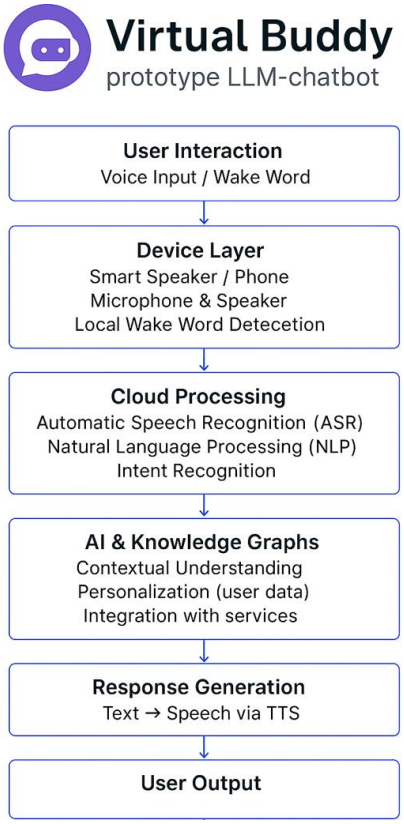
2. Dragon Naturally Speaking

Type:	Premium speech-to-text software
Support Provided:	– Offers high-accuracy dictation and customizable voice commands, enabling full control of writing tasks and device navigation without manual input. – Source & Evidence: Recognized as a leading speech-to-text solution in assistive technology for students with motor disabilities.

Dragon NaturallySpeaking is advanced speech-to-text software that transforms spoken language into accurate written text in real time. Developed by Nuance Communications, it is widely used for productivity, transcription, and accessibility needs. The software supports voice commands, dictation, document creation, and integration with many applications. Nuance provides technical support, updates, training materials, and customer assistance. Usage requires installation on a compatible Windows system, and licensing is commercial, typically offered as individual, professional, or enterprise plans tied to specific users and versions.

3. Virtual Buddy (prototype LLM-chatbot for motor-impaired users)

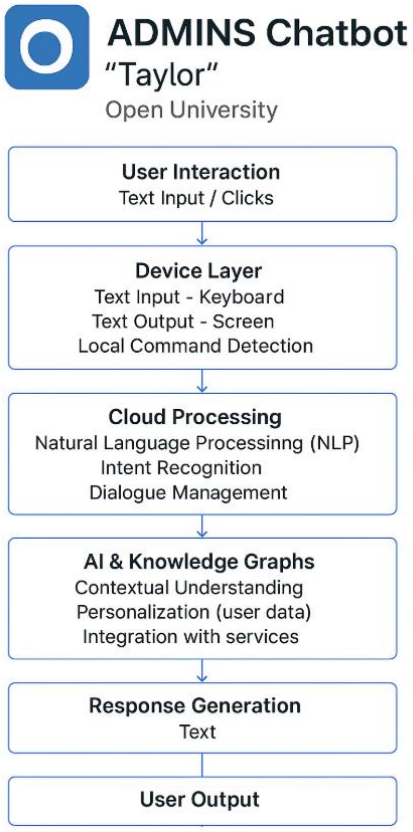
Type:	Conversational AI prototype
Support Provided:	– Tailored agent personas reduce input frequency; designed to facilitate topic-based conversational support with minimal typing for individuals with limited hand-control. – Source & Evidence: Developed for users with neuromuscular diseases to ease conversational burdens arXiv.



Virtual Buddy is a prototype LLM-powered chatbot created to support motor-impaired users by enabling interaction through voice, simplified controls, or adaptive interfaces. Developed as an experimental accessibility tool within research settings, it focuses on offering conversational assistance, guidance for daily tasks, and customizable responses that adjust to individual needs. Support is provided through documentation, pilot testing feedback, and developer-led updates. Usage is limited to controlled trials and evaluation projects. Licensing is non-commercial and research-oriented, granting access only for testing, refinement, and accessibility studies.

4. ADMINS Chatbot ("Taylor") – Open University

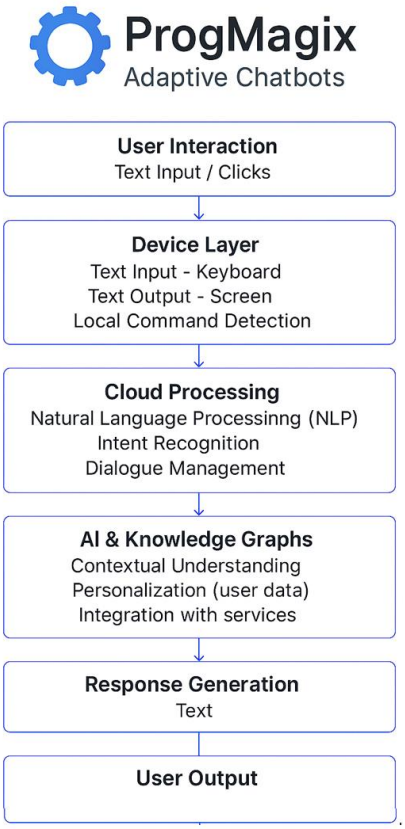
Type:	Custom educational chatbot
Support Provided:	– Guides students through disability disclosure and support processes via text or voice conversation—less physically demanding than form-filling. – Improves comfort and autonomy in administrative tasks. – Source & Evidence: Developed by OU with Microsoft's AI for Accessibility; students preferred conversational disclosure Education Directory+15Institute of Educational Technology+15The Official Microsoft Blog+15 A literacy support platform designed to help students with reading, writing, comprehension, and studying. Texthelp



ADMINS Chatbot ("Taylor") is an AI conversational assistant created to help users complete administrative tasks by guiding them through forms, procedures, and information requirements using natural language. Developed in a research and educational setting, it focuses on improving accessibility and reducing paperwork barriers. Support is offered through project documentation, user guidance, and maintainer feedback. Usage is restricted to pilot studies and controlled deployments. Licensing is non-commercial, granted for research evaluation and development purposes only.

5. Progmagix Adaptive Chatbots

Type:	Custom AI-chatbot platform for special education
Support Provided:	– Personalizes learning for students with disabilities (e.g., dyslexia) using adaptive dialogue, real-time feedback, multimodal interaction (text, visuals, audio), and progress tracking – Source & Evidence: Described as tailored AI chatbots to help students with learning needs blog.progmagix.ai.



Progmagix Adaptive Chatbots are AI-driven conversational agents designed to provide personalized support across customer service, education, and accessibility applications. Developed by Progmagix, these chatbots adapt to user behavior, preferences, and context to deliver more relevant responses and assistance. Support is provided through technical documentation, user guides, updates, and developer assistance channels. Usage requires integration with compatible platforms, and licensing is commercial, offered as subscription-based or enterprise solutions depending on deployment scale and feature requirements.

Table 1. Tools

Tool	Interaction Mode	Key Benefits for Motor-Impaired Students
Google/Siri/Alexa	Voice commands	Hands-free control, dictation, task management
Dragon NaturallySpeaking	Speech-to-text	Accurate writing, device navigation without typing
Virtual Buddy (prototype)	Conversational AI	Simplifies chat with minimal typing via customizable agents
ADMINS "Taylor" Chatbot	Text/Voice chat	Streamlined administrative support without form-based interaction
Progmagix Chatbots	Adaptive AI chat	Personalized study support, multimodal interaction, progress feedback

These chatbots reduce physical effort, promote independence, and enhance engagement for students with motor disabilities by offering voice-first or low-intensity input methods.

How AI Supports Students with Motor Disabilities

Students with motor disabilities face persistent barriers to participation in classrooms, digital learning, communication, and physical interaction with learning environments. Artificial intelligence (AI) — including machine learning (ML), deep learning (DL), natural language processing (NLP), and human-computer interaction (HCI) advances — is rapidly enabling novel assistive technologies (AT) that improve autonomy, communication speed, learning access, and physical participation. This review synthesizes current AI-driven approaches used specifically to support students with motor impairments: brain-computer interfaces (BCIs), eye-gaze interfaces and eye-tracking AAC (augmentative and alternative communication), predictive text and language models to accelerate text entry, gesture and intent recognition for alternative input, adaptive user interfaces that compensate for reduced control, and robotic/exoskeleton aids for mobility and participation. Authors (Cai et al., 2024) summarize technical architectures, evaluation metrics, user acceptance considerations, and classroom integration strategies and highlight notable recent high-impact studies showing large performance gains when AI components (e.g., LLM-based sentence expansion, ML-based gaze prediction, CNN classifiers for EEG decoding) are carefully integrated with human-centered design. Finally, we outline research gaps, ethical considerations (safety, fairness, privacy), and recommended directions for practitioners and researchers.

Motor disabilities (congenital or acquired) affecting fine or gross motor control — e.g., cerebral palsy, spinal cord injury, amyotrophic lateral sclerosis (ALS), traumatic brain injury — create specific challenges for students in educational settings. These challenges include: slow or impossible handwriting and typing, difficulty operating input devices (mouse, touchscreen), limited ability to manipulate physical learning materials, and reduced capacity to move through school spaces. Beyond interaction, motor disabilities can introduce secondary access barriers to socially mediated learning: hesitation to participate in discussions, difficulty using assistive communication devices, and fatigue from prolonged physical effort.

AI contributes to assistive tech through improved sensing, robust pattern recognition, predictive modeling, and language understanding — all critical where direct motor control is limited. Modern ML and DL models can decode subtle physiological signals (e.g., EEG) and eye-gaze trajectories, infer the user's intended text from partial inputs, adapt interfaces in real time to minimize effort, and control robotic actuators for mobility support. Recent demonstrations

show that language models and sequence-prediction models can drastically reduce the number of physical actions needed to produce complex outputs (e.g., full sentences), a major win for students with severe motor impairments. These approaches (Cai et al., 2024) combine interdisciplinary advances in neuroscience, HCI, and AI systems engineering.

Categories of AI-enabled support

We group AI contributions into six major categories relevant to students.

Brain-Computer Interfaces (BCIs). What they do. BCIs aim to provide a direct communication/control channel between the user's brain activity and external devices (computers, AAC systems, wheelchairs). For students, BCIs can enable typing, selection of instructional content, and control of educational software without muscular output.

Technical foundations. Non-invasive EEG remains the most practical BCI option in educational settings. Modern BCI pipelines use pre-processing (artifact rejection, bandpass filters), feature extraction (time/frequency features, spatial filters like common spatial patterns), and ML classifiers/regressors (SVMs, RNNs, CNNs, and recently transformer-based architectures) to map EEG patterns to discrete commands or continuous control signals. Training approaches include supervised calibration sessions and adaptive online learning to track nonstationary EEG distributions.

Strengths and limitations. BCIs can provide access where other input modalities fail, but they face variability across users, relatively low bit-rates compared to manual typing, and susceptibility to noise and fatigue. Combining BCIs with predictive language models or other input modalities (hybrid BCIs) has been shown to increase practical communication rates and user satisfaction. Reviews emphasize both technical progress and open questions about reliably translating BCI use into inclusive educational contexts (Maiseli et al. 2023).

Eye-gaze and eye-tracking AAC. What they do. Eye-gaze systems map the point of regard (gaze) to selections on on-screen keyboards or symbol matrices, enabling users to "type" by looking. AI enhances robustness (calibration-free gaze estimation), prediction (next-word, phrase completion), and interface adaptation (dynamic layouts based on attention patterns).

Technical foundations. Modern systems combine computer vision for pupil and corneal reflection detection, gaze mapping algorithms, and ML models that predict intended selections

from partial gaze streams. Eye-tracking data also enable passive measures of attention and learning engagement.

Evidence. Controlled studies and scoping reviews report that gaze-based AAC is viable for students with severe motor dysfunction when supported by predictive language models and interface optimizations. Recent work demonstrates that LLM-based expansion systems can convert minimal gaze input (initial letters or short phrases) into multiple candidate sentences — dramatically increasing communication speed and reducing fatigue. Eye-tracking also provides valuable outcome measures for usability studies of AAC displays. (Fischer-Jancen et al. 2024)

Predictive text, language models, and NLP. What they do. Predictive text systems use statistical or neural language models to suggest completions for partial inputs (next character, next word, or full-sentence suggestions). For motor-impaired students, this reduces the required number of selections to produce text for assignments, chat, or AAC communication.

Technical foundations. State-of-the-art systems use transformer-based models (small LLMs fine-tuned for assistive contexts) to generate candidate sentence completions from small cues, combined with ranking models tailored to the user's vocabulary and context. Some systems use a two-stage pipeline: (1) a light-weight on-device model for immediate suggestions, and (2) a cloud-based model for richer expansions when network and privacy constraints permit.

Impact. Research shows LLM-augmented systems can significantly reduce time per utterance in AAC tasks and dramatically improve the fluency of user output when the suggestions are relevant and controllable by the user. Practical considerations include latency, privacy (processing sensitive communications), and ensuring model outputs are non-biased and controllable (Cai et al. 2024)

Gesture and intent recognition (camera / IMU / EMG). What they do. Where residual limb movement is available, AI systems map minimal gestures (e.g., small wrist twitch, head tilt, facial expression) to control commands. Systems using cameras, inertial measurement units (IMUs), or surface electromyography (sEMG) benefit from ML classifiers that translate noisy sensor streams into robust, user-specific control vocabularies.

Technical foundations. Typical pipelines include sensor fusion (combining multiple sensor modalities), feature extraction (time-domain, frequency, spatial), and classifiers (random forests, SVMs, CNNs) or temporal models (LSTM, GRU) for time-dependent gestures. Transfer learning and few-shot adaptation permit rapid personalization with few training examples.

Use cases. Gesture recognition is commonly used to control on-screen cursors, switch interfaces, and simple robotic manipulators. When combined with adaptive interface strategies, gesture systems allow students to navigate educational software with markedly reduced physical effort.

Adaptive user interfaces and personalization. What they do. AI adapts layout, timing, target sizes, dwell times, and assistance levels to minimize physical effort and maximize success. Examples include dynamic keyboard resizing, context-aware button prediction, and adaptive dwell-click thresholds for gaze systems.

Technical foundations. Reinforcement learning (RL), contextual bandits, and supervised personalization models are used to adapt interfaces to the user's performance profile. Online learning updates parameters as the user's motor performance changes (e.g., due to fatigue or medication cycles).

Evidence and practice. Trials show adaptive interfaces reduce error rates and task completion times compared to static designs. Importantly, personalization must be transparent and reversible: users should understand and control adaptation to avoid confusion or loss of agency.

Practical recommendations for practitioners

- **Start small:** pilot one classroom activity (e.g., essay drafting with predictive text) and iteratively expand.
- **Prioritize training:** invest in teacher and aide training on calibration and basic troubleshooting.
- **Choose hybrid systems:** combine gaze + prediction + simple physical switches to maximize reliability.
- **Plan privacy:** use local processing for sensitive data; get explicit consent and document data retention.

- **Measure both performance and experience:** track throughput and fatigue, but also subjective satisfaction and perceived inclusion.
- **Engage stakeholders:** involve parents, therapists, and students in setting goals and evaluating success.
- **Budget for service:** ensure ongoing technical support and device maintenance funds.

Table 2. Key features and technologies.

Tool	Key Support Features for Motor Disabilities
Google/Siri/Alexa	Voice-controlled device interaction, task automation, hands-free learning
Dragon NaturallySpeaking	Dictation, voice navigation, custom voice commands
Virtual Buddy	Minimal input conversational AI, adaptive responses
ADMINS "Taylor"	Conversational support for admin tasks, multimodal input
Progmagix Chatbots	Adaptive learning, multimodal interfaces, real-time feedback

Teacher's Role and pedagogical models suggested to use

Educators play a pivotal role in facilitating the use of AI tools to support students with motor disabilities. First, teachers must accurately identify students' needs via Individual Education Plans (IEPs) and collaborate with specialists such as occupational therapists to determine which AI solutions—like speech-to-text or eye-tracking—will best address fine motor limitations. This requires baseline assessments and ongoing data analysis to match tools with individual needs. Next, teachers integrate AI tools into Universal Design for Learning (UDL)–based lesson plans. They adjust classroom activities to provide multiple means of action and expression, replacing manual assignments with voice input or gesture controls and embedding AI-supported tasks within curriculum goals. Customizing content ensures that students can fully access and engage in learning.

Teachers must also ensure proper training and scaffolding. They guide learners in using tools effectively, teaching voice commands, setting up adaptive devices, and troubleshooting issues such as inaccurate speech recognition in noisy environments.

An essential part of the role is continuous monitoring and adaptive instruction. AI platforms provide real-time feedback on student interaction patterns—teachers interpret this data to refine teaching strategies, adjust tool configurations, and identify emerging challenges or progress milestones.

Collaboration is critical: teachers coordinate with IT staff, special educators, therapists, and families to ensure smooth implementation, share insights, and align AI use with therapeutic goals

Finally, teachers foster an inclusive classroom environment. They raise peer awareness, encourage collaborative group tasks that normalize AI use, and apply ethical considerations related to data privacy and equity—ensuring that AI supports, but does not replace, human relationship and agency. We recommend to focus on:

- User-centered co-design. Engage students, families, teachers, and therapists from the outset. Co-design reduces abandonment and ensures that solutions address actual classroom workflows.
- Multimodal redundancy. Provide multiple input pathways (e.g., gaze + switch + speech recognition) to handle fatigue and context changes.
- Privacy and data governance. Educational deployments must follow local privacy laws (e.g., GDPR, FERPA). Where LLMs or cloud services are used, obtain informed consent and minimize sensitive data transfer. Offer local/offline operation where possible.
- Transparency and controllability. Provide clear affordances for accepting/rejecting AI suggestions. Visual or auditory confirmation reduces errors and preserves agency.
- Training and technical support. Teachers and support staff need training for calibration, troubleshooting, and instruction adaptation. Institutions should budget ongoing technical support and device maintenance.
- Evaluation and iteration. Monitor both objective performance and subjective experience; iterate on interface parameters (dwell times, target sizes) responsive to real classroom data.
- Accessibility-first content design. Instructors should provide content that is compatible with assistive workflows (e.g., structured digital resources, alt text, accessible PDFs).

- Interoperability. Prefer solutions that export/import standards (e.g., AAC vocabularies, educational LMS integrations) to avoid workflow friction.

Applying these principles increases the likelihood that AI-enabled assistive systems will become sustainable parts of inclusive schooling rather than short-term trials (Ventura et al.2023).

By combining individualized assessments, UDL based lesson design, scaffolded training, dynamic data driven adjustment, multidisciplinary collaboration, and ethical inclusion, teachers become the linchpin in leveraging AI to empower students with motor disabilities.

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Internet resources

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AI IN THE CLASSROOM: GENERAL IMPACTS The integration of AI into classrooms has already begun to alter the educational landscape. These technologies offer tremendous promise in addressing the broad sp...

AI for Special Education: Empowering Differently-Abled Students

PERSONALIZED LEARNING PATHWAYS * AI can customize learning content to suit the needs of each student. * It adapts to the student's pace, providing immediate feedback, ensuring a better understanding...

Factors influencing the intention of trainee special education teachers to integrate assistive technology into teaching students with disabilities in the United Arab Emirates – PMC

However, advocacy [22] on behalf of such children has led to the recognition of the need for education through special schools or inclusion programmes, which have been incorporated into the educationa...

The Role of AI in Special Education

PERSONALIZED LEARNING AND ADAPTIVE TECHNOLOGY One of AI's most significant

SCENARIO 2. Text-to-speech and speech-to-text software

Introduction to the Scenario

The scenario "Diagnostic, Monitoring, & Intervention Systems" is discussed by Kaunas University of Technology researchers. Beyond instruction, AI can play a role in early diagnosis and ongoing monitoring of disabilities. Machine learning applied to speech patterns, handwriting, response time, errors in reading or math tasks can flag anomalies that suggest dyslexia, processing disorders, or other special educational needs. Furthermore, intervention systems (games, augmented reality, LLM-based tools) can deliver repeated practice, social or emotional skills training, or executive function coaching, with real-time metrics so that teachers and specialists can adapt the IEPs. Voultsiou, E., & Moussiades, L. (2025). Presented a systematic review of AI, VR, and large language model (LLM) applications for special education shows that these technologies are especially valuable in cognitive development, social engagement, and personalized learning for students with special educational needs and disabilities.

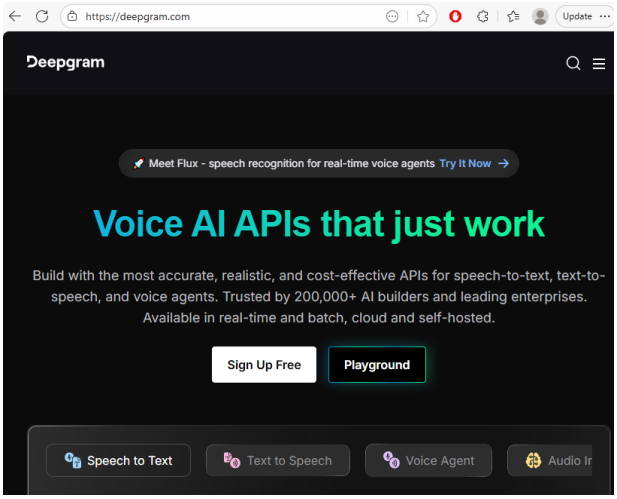
The aim of the Scenario

The aim of the scenario **"**Text-to-Speech and Speech-to-Text Software" is to support students with special educational needs by enabling accessible communication, learning, and assessment. Leveraging AI and machine learning, these tools can assist in early diagnosis and ongoing monitoring of speech, language, and cognitive patterns, flagging potential difficulties such as dyslexia or processing disorders. They also provide adaptive interventions, allowing real-time feedback, personalized practice, and communication support, helping teachers and specialists tailor instruction and IEPs to individual learners' needs.

AI Tool(s) Description

1. Deepgram

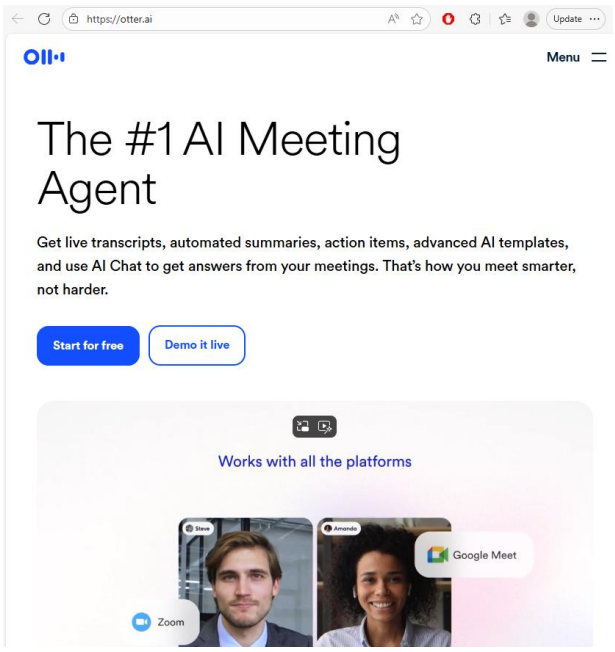
Deepgram — Provides unified APIs for both speech-to-text (STT) and text-to-speech (TTS). Known for its high accuracy, low latency, and scalable enterprise solutions.



Deepgram is an AI-powered speech recognition platform that provides both speech-to-text (STT) and text-to-speech (TTS) capabilities. Developed by Deepgram Inc., it is designed for high accuracy, low latency, and scalable deployment in enterprise and educational settings. Deepgram supports transcription of audio and video content, real-time streaming, and custom model training to adapt to specialized vocabularies. Support includes documentation, API guides, customer assistance, and developer resources. Usage requires integration via APIs, and licensing is commercial, typically subscription-based, with pricing depending on volume, features, and deployment scale.

2. Otter.ai

Otter.ai — Transcription service using AI, great for meetings, lectures, and interviews; offers real-time speech-to-text.

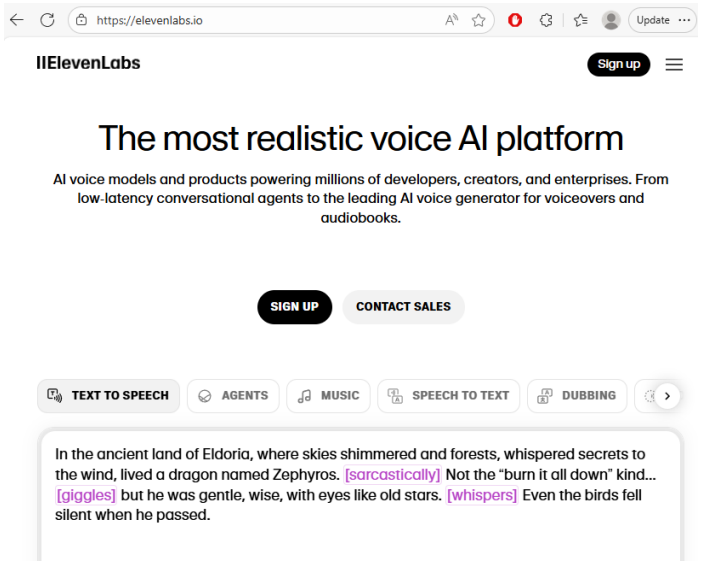


Otter.ai is an AI-driven transcription service that converts speech into accurate text in real time, ideal for lectures, meetings, interviews, and study sessions. Developed by AI Sense Inc., Otter.ai provides features such as live transcription, searchable notes, speaker identification, and collaborative editing. Support is offered through online documentation, tutorials, FAQs, and customer service channels. The platform

is accessible via web and mobile apps. Usage is subscription-based, with free and premium plans available, and licensing is commercial, tied to individual or organizational accounts, allowing integration into educational and professional environments.

3. ElevenLabs

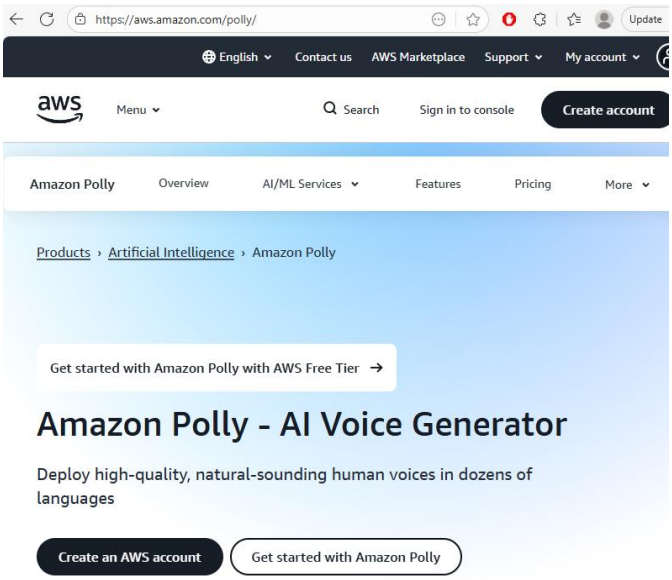
ElevenLabs — Specializes in high-quality, expressive text-to-speech with voice cloning and emotional control.



ElevenLabs is an AI voice-technology company known for highly realistic text-to-speech, voice cloning, and multilingual dubbing. It provides tools for creators, businesses, and developers to generate natural voices in many languages. Developer support includes APIs, SDKs, documentation, and integrations for building apps that use speech generation or voice conversion. Usage is based on a credit system with free and paid tiers. Licensing allows commercial use of shared voices, while custom voices require users to grant ElevenLabs permission to process and store voice data to operate and improve its services.

4. Amazon Polly

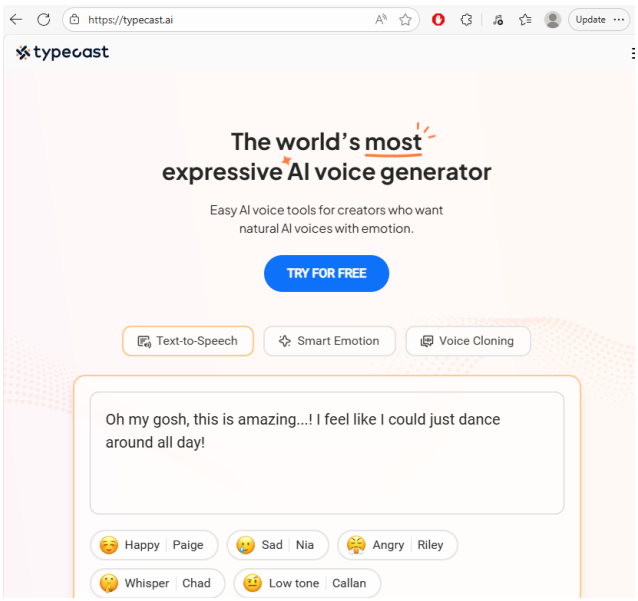
A scalable TTS service from AWS with neural voices, support for many languages, and real-time streaming.



Amazon Polly is a cloud-based text-to-speech service from AWS that converts written text into natural-sounding audio in dozens of languages and voices. It is designed for applications like narration, IVR systems, accessibility tools, and real-time speech generation. Developers get full API access, SDKs for major languages, SSML support, speech marks, and real-time streaming. Usage is pay-as-you-go based on characters processed, with a free tier for new AWS users. Licensing allows generated speech to be used commercially, while responsibility for rights, compliance, and content remains with the user.

5. Typecast

Typecast — Cloud-based TTS tool by Neosapience, offering emotionally expressive voices, avatar generation, and video voiceovers.



Typecast is an AI voice and avatar platform developed by Neosapience, offering realistic text-to-speech, expressive voices, and digital characters for videos, narration, and content creation. It provides many preset voices and supports custom AI voices with emotional control. Developers can use a REST API with detailed documentation, examples,

and webhook support to generate speech programmatically. Usage is subscription-based with free and paid tiers. Licensing is proprietary: voice assets are rented while subscribed, and permanent usage rights require an additional purchase.

How AI Supports Students

AI-powered text-to-speech (TTS) and speech-to-text (STT) tools are transforming the way students' access, interact with, and retain educational content. These tools provide critical support for students with disabilities, learning difficulties, or language barriers, while also enhancing general learning efficiency and engagement. Each tool offers unique features that cater to different learning needs, making them valuable additions to modern classrooms and remote learning environments.

Deepgram is a highly accurate, low-latency platform that provides both STT and TTS capabilities. For students, Deepgram can transcribe lectures, classroom discussions, and verbal student inputs in real time. This is especially beneficial for students with hearing impairments, as it ensures they can access spoken content in written form without missing any important information. Additionally, its text-to-speech features allow students with reading difficulties, dyslexia, or visual impairments to hear written content read aloud, improving comprehension and retention. Deepgram's scalable enterprise solutions also make it suitable for large classrooms or online learning platforms, enabling seamless integration into educational ecosystems. Its ability to process multiple voices and accents accurately ensures inclusivity in linguistically diverse settings.

Otter.ai focuses primarily on real-time transcription, making it ideal for capturing lectures, meetings, and group study sessions. Students with attention deficits or processing challenges can benefit from Otter.ai by following along more effectively and revisiting transcriptions to review and reinforce learning. The platform allows students to highlight key points, add comments, and organize notes, supporting active engagement and comprehension. Otter.ai also helps students who are non-native speakers by providing a textual record they can read alongside spoken content, improving both understanding and language skills. For students with disabilities that affect note-taking, Otter.ai offers a practical solution to independently manage academic tasks.

ElevenLabs is a TTS platform that produces high-quality, expressive, and natural-sounding speech. Its voice cloning and emotional control features enhance engagement and comprehension, particularly for students with learning disabilities or those who struggle with traditional reading. By conveying emotion, tone, and nuance, ElevenLabs makes educational content more relatable and easier to understand. Students with attention or focus issues can benefit from listening to content that is more dynamic and engaging than standard robotic TTS voices. The platform also supports accessibility in creative projects, storytelling, and multimedia learning materials, giving students a richer educational experience.

Amazon Polly provides scalable TTS services with neural voices, supporting multiple languages and real-time streaming. Its multilingual capabilities are particularly beneficial for students learning in a non-native language or in multicultural classrooms. By converting written content into natural speech, Amazon Polly helps students with dyslexia, visual impairments, or other reading difficulties access materials independently. Its real-time streaming capabilities allow integration into interactive applications, educational games, and adaptive learning systems. Polly's TTS can also be used to create audio versions of textbooks, quizzes, and study guides, reducing barriers to learning and enabling more inclusive educational practices.

Typecast is a cloud-based TTS tool offering emotionally expressive voices, avatar-based speech, and video voiceovers. For students, Typecast enhances comprehension and engagement by providing visually and audibly rich learning materials. Avatar-based voiceovers can guide students through complex instructions, experiments, or assignments, offering a personalized learning experience. Emotionally expressive TTS improves understanding of context, tone, and narrative, which is particularly helpful for students with cognitive or social-emotional learning needs. Typecast also enables students to create multimedia projects, presentations, and storytelling exercises, promoting creativity while supporting accessibility.

Overall, these AI tools provide a comprehensive set of supports for diverse learning needs. Speech-to-text functionalities help capture spoken information accurately, ensuring that students with hearing impairments or note-taking difficulties do not fall behind. Text-to-speech functionalities provide access to written content in audio format, supporting reading comprehension, engagement, and learning retention for students with dyslexia, visual impairments, or cognitive challenges. Additionally, expressive voices, multilingual support, and

real-time processing enhance inclusivity, making education more accessible and personalized. By integrating these tools into classrooms, educational software, or remote learning platforms, teachers and specialists can create adaptive learning environments that respond to individual needs, promote independent learning, and ensure that all students can access educational content effectively.

Teacher's Role and pedagogical models suggested to use

The integration of AI-powered text-to-speech (TTS) and speech-to-text (STT) tools such as Deepgram, Otter.ai, ElevenLabs, Amazon Polly, and Typecast has the potential to transform pedagogical practices and expand the teacher's role in inclusive and personalized education. These tools provide teachers with powerful means to enhance accessibility, engagement, and individualized support for students, particularly those with learning disabilities, speech or hearing impairments, and diverse cognitive needs. Effective use of these technologies requires teachers to adapt their instructional strategies and embrace pedagogical models that promote active learning, differentiated instruction, and student-centered engagement.

Teacher's Role

With these AI tools, teachers shift from being the sole providers of content to facilitators of learning who guide students in accessing, interpreting, and interacting with information. For instance, using Deepgram, teachers can provide real-time transcriptions of lectures or discussions, enabling students with hearing impairments or note-taking challenges to follow lessons independently. Teachers are responsible for curating content, highlighting essential concepts, and integrating these transcripts into lesson plans or study guides. They also monitor students' progress through analytics provided by AI tools, identifying areas where additional support is needed.

When employing Otter.ai, teachers can facilitate collaborative learning by providing accurate transcription of group activities, student presentations, and discussions. This allows students to review sessions asynchronously, reinforcing understanding and enabling self-paced learning. Teachers act as moderators and guides, ensuring students learn how to utilize transcripts for studying, reflecting, and organizing knowledge, thereby fostering metacognitive skills.

With ElevenLabs, Amazon Polly, and Typecast, teachers can enhance content delivery using expressive and natural-sounding TTS. The teacher's role involves selecting appropriate materials, adjusting the emotional tone and voice quality to maintain student engagement, and designing tasks that integrate audio content with written materials. For example, teachers can create storytelling exercises, language learning activities, or reading comprehension tasks where expressive voices convey nuance and context, supporting students who struggle with decoding text or maintaining focus.

Pedagogical Models

The emergence of Generative Artificial Intelligence (GenAI) marks a fundamental transformation in education, mirroring wider technological changes across society. This conceptual article positions GenAI not merely as a tool, but as a relational paradigm shift that redefines pedagogy. Drawing on posthumanist and phenomenological perspectives, we explore how AI reshapes educational practice, focusing on shifts in pedagogy, teacher identity and student engagement (Creely & Carabott, 2025). Several pedagogical models are particularly effective when using these AI tools.

- Universal Design for Learning (UDL): AI-powered TTS and STT tools align closely with UDL principles by providing multiple means of representation, engagement, and expression. Teachers can offer materials in both text and audio formats, ensuring that students with diverse abilities access content in the mode that works best for them. Real-time transcription and expressive TTS support comprehension, memory, and participation (Cha & Ahn, 2014).

- Flipped Classroom: By leveraging AI-generated transcripts and audio content, teachers can flip the classroom, providing students with pre-recorded lectures or lessons to review at their own pace (Diwanji et al. 2018). Class time is then dedicated to active learning, discussion, and personalized guidance. Tools like Deepgram and Otter.ai make it easy to generate accurate transcripts, while expressive TTS from ElevenLabs, Amazon Polly, or Typecast transforms static text into engaging audio resources.

- Differentiated Instruction: AI tools enable teachers to differentiate learning based on student needs (Ruslim & Khalid, 2024). Teachers can adjust the format, pace, and complexity of materials, providing audio support for students with reading difficulties

or transcription support for students with hearing impairments. For example, students who struggle with comprehension can listen to lessons via expressive TTS, while others can use STT transcripts for note-taking or revision.

- Blended and Remote Learning: In online or hybrid environments, these AI tools allow teachers to maintain accessibility and engagement. Real-time transcription and TTS ensure that all students, regardless of their location or abilities, can participate in synchronous and asynchronous activities. Teachers can monitor interactions, provide feedback, and guide students in using AI tools to support independent learning.

- Active and Constructivist Learning: Teachers can design activities where students interact with AI-generated content to construct knowledge actively (Attaluri, & Mudunuri, 2025). For instance, students can create presentations or multimedia projects using Typecast's expressive voices and avatars or use ElevenLabs' TTS for storytelling and oral assignments. Teachers facilitate these projects by scaffolding tasks, encouraging reflection, and integrating feedback.

In summary, AI-powered TTS and STT tools expand the teacher's role from content delivery to facilitation, guidance, and support for personalized learning. Teachers become designers of inclusive, adaptive learning experiences, leveraging AI to support comprehension, engagement, and independent study. Pedagogical models such as UDL, flipped classroom, differentiated instruction, blended learning, and active learning provide frameworks for effectively integrating these technologies, ensuring that all students can participate, access content, and achieve learning outcomes.

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SCENARIO 3. Voice assistants

Introduction to the Scenario

The scenario "Voice Assistants & Conversational Interfaces" is discussed by Kaunas University of Technology researchers. Voice assistants and conversational agents represent a concrete AI technology that can directly support students with disabilities in multiple ways. For students with visual impairments or motor difficulties, speech recognition and voice output enable hands-free access to content. Conversational interfaces can simplify complex instructions, read aloud texts, convert speech into structured notes, or provide immediate verbal feedback. Voice assistants can also help with daily routines, reminders, managing schedules, and thus reduce cognitive load for students with executive functioning challenges. Empirical evidence from rapid reviews indicates these tools are used by people with various disabilities for interface control, reminders, environmental control, and independence tasks. Barriers are also noted: speech recognition misinterpretation especially for non-typical speech, cognitive load, concerns about privacy, limited customization for individual needs

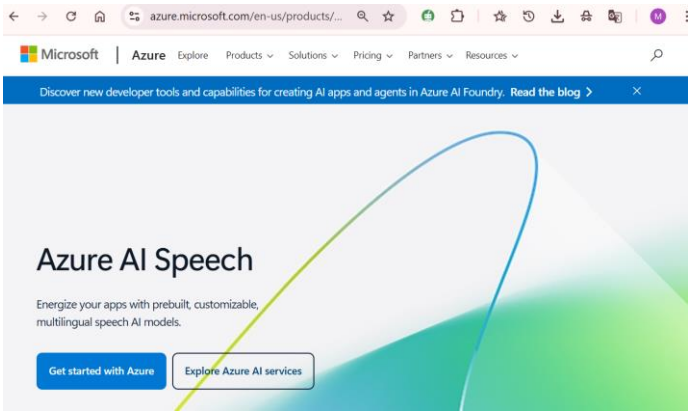
The aim of the Scenario

The aim of the scenario is focused on students with visual impairments or motor difficulties, speech recognition and voice output enable hands-free access to content.

AI Tool(s) Description

1. Microsoft Azure Cognitive Services (Speech + Conversational AI)

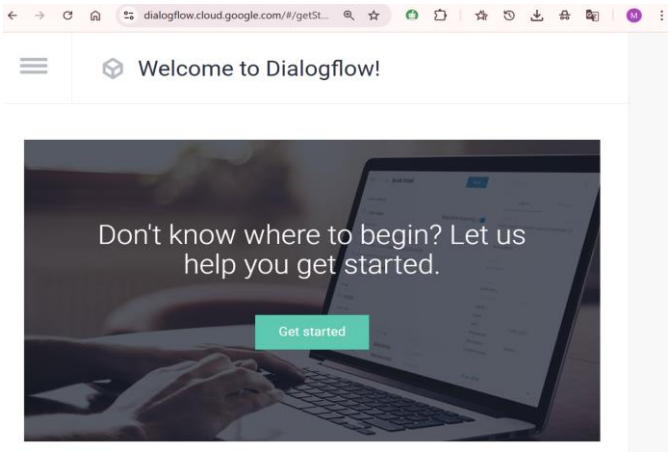
Provides high-accuracy speech-to-text, text-to-speech, custom voice models, and language understanding. Useful for hands-free access, reading aloud, structured note-taking, and adaptive conversational tutoring.



Microsoft Azure Cognitive Services offers Speech and Conversational AI capabilities, enabling developers to build applications with speech recognition, text-to-speech, translation, and intelligent chatbots. Developed by Microsoft, these services integrate AI models for natural language understanding and voice interactions across multiple platforms. Support is provided via extensive documentation, tutorials, community forums, and Azure technical support plans. Usage requires an Azure account, with pricing based on resource consumption and service tiers. Licensing follows Microsoft's cloud terms, including free tiers, pay-as-you-go, and enterprise agreements for larger deployments.

2. Google Dialogflow + Speech Services

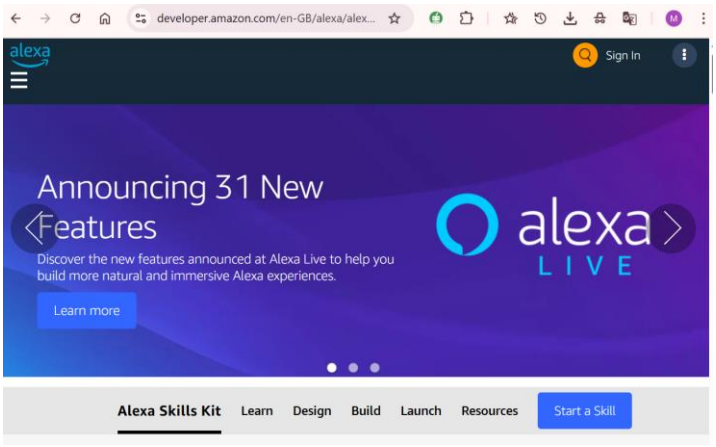
A conversational-agent framework with strong multilingual capabilities. Supports voice input/output, routine reminders, educational chatbots, and personalized conversational flows for students with cognitive or motor impairments.



Google Dialogflow is a cloud-based platform for building conversational interfaces, including chatbots and voice assistants. It supports natural language understanding and can integrate with Google Cloud Speech-to-Text and Text-to-Speech services for voice interactions. Developed by Google, Dialogflow provides tools for designing, testing, and deploying conversational agents across multiple platforms. Support is available through documentation, community forums, and Google Cloud support plans. Usage requires a Google Cloud account, and pricing is based on the edition and usage levels. Licensing follows Google Cloud's standard terms, with free tiers and pay-as-you-go options.

3. Amazon Alexa Skills Kit (ASK)

Allows building custom voice-assistant skills. Good for accessibility scenarios: schedule management, reminders, reading tasks aloud, step-by-step guidance, and smart-environment control for students with disabilities.

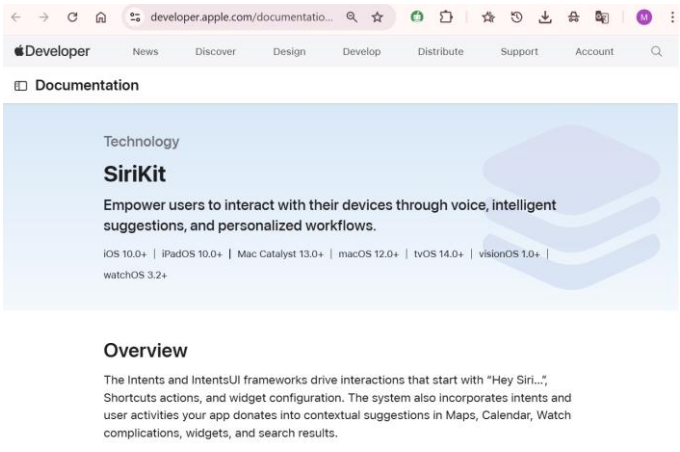


Amazon Alexa Skills Kit (ASK) is a collection of tools, APIs, and documentation that allows developers to create voice-driven applications, called Alexa Skills, for Alexa-enabled devices. Developed by Amazon, ASK supports natural language understanding, voice interactions, and integration with external services. Support is provided through detailed documentation, developer forums, tutorials, and AWS support plans. Usage requires an Amazon developer account, and skills can be tested, published, and monetized via the Alexa

Skills Store. Licensing follows Amazon's developer agreement, with no upfront cost, and usage may incur AWS service fees depending on integration and consumption.

4. Apple SiriKit + Accessibility APIs

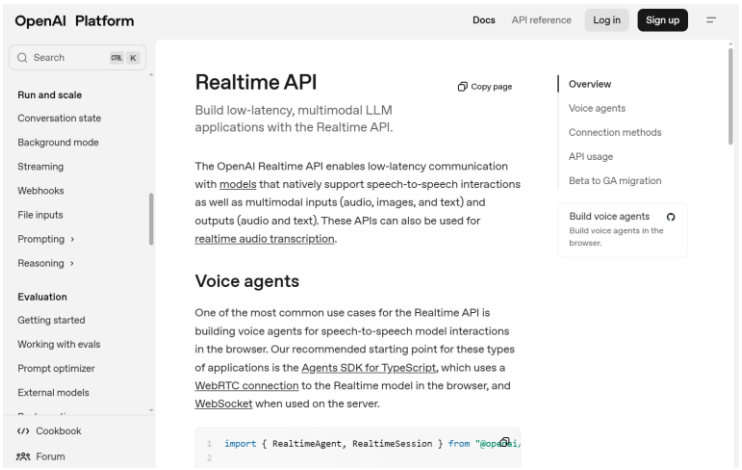
Useful in iOS-based learning environments. SiriKit enables hands-free educational interactions, dictation, and reminders. Apple's accessibility APIs (VoiceOver, Switch Control, Spoken Content) strengthen support for visual and motor impairments.



Apple SiriKit and Accessibility APIs enable developers to integrate voice interactions and accessibility features into iOS, iPadOS, macOS, watchOS, and tvOS apps. SiriKit allows apps to respond to user requests via Siri, while Accessibility APIs support features like VoiceOver, Switch Control, and dynamic text for inclusive experiences. Developed by Apple, these tools are supported through official documentation, sample code, developer forums, and Apple Developer support. Usage requires an Apple Developer account. Licensing follows Apple's developer agreements, with free access to APIs, though app distribution requires compliance with App Store guidelines and may incur developer program fees.

5. OpenAI Voice & Realtime API

Provides advanced natural conversational interaction, real-time speech recognition, expressive TTS, and memory-supported dialogues. Suitable for scenario simulations like adaptive tutoring, cognitive-load reduction, and personalized learning companions.



OpenAI Voice and Realtime APIs enable developers to build applications with real-time speech recognition, text-to-speech, and interactive conversational AI. These APIs allow voice-based interactions, streaming responses, and integration into chatbots, virtual assistants, and other real-time applications. Developed by OpenAI, support is provided through documentation, guides, community forums, and OpenAI's customer support channels. Usage requires an OpenAI account, with pricing based on API calls, token usage, or streaming duration. Licensing follows OpenAI's API terms of service, including usage limits, content guidelines, and subscription or pay-as-you-go models.

How AI Supports Students

Voice assistants and conversational AI platforms offer powerful opportunities to improve accessibility, autonomy, and participation for students with special needs. Each tool contributes differently, but all share the ability to reduce barriers related to vision, motor skills, language processing, memory, executive functioning, and learning differences.

Microsoft Azure Cognitive Services supports students with special needs through advanced speech-to-text, text-to-speech, and custom voice features. For learners with visual impairments, Azure's high-quality voice output can read digital textbooks, classroom materials, or step-by-step instructions out loud. Students with motor impairments benefit from hands-free control of devices and interfaces through precise speech recognition. Azure's custom speech models can be trained to better understand non-typical or disordered speech, which is crucial for learners with articulation challenges or conditions such as cerebral palsy or dysarthria. Natural language understanding services can be integrated into tutoring agents that adjust explanations or simplify instructions, supporting students with dyslexia or processing difficulties. The system's flexibility allows educators to build conversational tools that match individual needs rather than expecting students to adapt to rigid interfaces.

Google Dialogflow combined with Google Speech Services enables the creation of fully conversational learning assistants that respond to voice input, provide instant feedback, and help students perform academic tasks. Because Dialogflow allows highly structured conversational flow design, educators can create guided learning experiences that break down complex procedures into simple steps. This supports students with ADHD, autism spectrum conditions, or executive-functioning challenges who may struggle with multi-step tasks. Google's multilingual speech recognition benefits learners from minority language backgrounds or those who code-switch. For students with visual impairments, the system can serve as an auditory interface to navigate educational applications or access information quickly. Dialogflow can also support social and communication skills training by simulating conversational scenarios in a safe, responsive manner.

Amazon Alexa Skills Kit (ASK) provides tools for creating personalized skills that help students manage daily routines, complete learning tasks, and navigate their environment. Alexa devices excel at hands-free interaction, making them suitable for students with mobility impairments or limited fine-motor control. Educators can build Alexa skills that deliver reminders for assignments, therapy sessions, medication schedules, or study routines, helping reduce cognitive load for students with memory or executive-functioning difficulties. The ability to read text aloud and provide step-by-step instructions supports learners with dyslexia or language processing challenges. Alexa can also interface with smart-home or classroom devices, enabling environmental control (lights, screens, doors) for students with physical disabilities. For students with social communication needs, simple dialogue-based activities can help practice conversation or emotional expression.

Apple SiriKit and Apple Accessibility APIs form a strong ecosystem for inclusive education, especially when students already use iPads or iPhones in school. Siri offers accessible voice control for navigation, messaging, researching, and task management. For students with visual impairments, iOS features such as VoiceOver, Spoken Content, and Braille displays provide a comprehensive multimodal experience. Siri can read instructions, answer questions, dictate notes, or launch apps without requiring touch input. Students with dyslexia can listen to assignments and dictate responses, bypassing the frustration of text entry. Apple's Switch Control and Voice Control support learners with severe motor impairments, enabling full access through switches, facial gestures, or speech-only interaction. SiriKit's integration with

reminders, calendars, and productivity apps makes it ideal for students who need help organizing their day.

The OpenAI Voice & Realtime API expands the possibilities of conversational support by enabling natural, fluid dialogue. Students can engage in open-ended conversations that adapt to their learning styles and emotional needs. This is especially beneficial for students with autism or social-communication challenges, who can practice interactions in a low-pressure environment. The expressive text-to-speech and highly responsive speech recognition help create tutoring systems that explain concepts in multiple ways, simplify instructions, or walk students through homework. For students with cognitive disabilities, the assistant can break tasks into manageable steps or rephrase content until understanding is achieved. OpenAI's real-time capabilities make it possible to create note-taking assistants that turn speech into organized summaries, assisting learners with dysgraphia, ADHD, or auditory processing difficulties. Because the system can maintain conversational context, it can provide support similar to a one-on-one aide or learning coach.

Across all these tools, the benefits converge into several key areas. Voice assistants reduce physical barriers for students who cannot easily use keyboards, screens, or traditional interfaces. They support cognitive accessibility by simplifying complex information, giving immediate feedback, managing reminders, and lowering executive-functioning demands. They improve access to educational content for visually impaired learners through high-quality text-to-speech and auditory navigation. For students with learning disabilities, they provide multimodal input and personalized explanations. They also enhance independence and confidence by enabling students to interact with technology in ways that feel intuitive and non-stigmatizing.

Despite limitations—such as occasional misrecognition of non-typical speech, privacy concerns, or the need for careful customization—these AI tools have the potential to transform inclusive education. When thoughtfully implemented, they help students with special needs participate more fully, learn more effectively, and gain greater autonomy inside and outside the classroom.

Teacher's Role and pedagogical models suggested to use

Teachers play a central role in ensuring that voice assistants and conversational interfaces become meaningful learning supports rather than isolated gadgets. While AI can provide accessibility, feedback, and personalized assistance, teachers remain the key designers of learning experiences, interpreters of student needs, and guardians of ethical use.

The teacher's first role is **orchestrating accessibility**. This involves selecting appropriate tools, configuring voice settings, setting reading speeds, training custom commands, and ensuring the AI can recognize each student's speech patterns. Teachers also help students develop confidence in using voice-based interfaces, especially learners who may hesitate due to articulation challenges or fear of errors (Drijvers, 2011). They model strategies for asking clear questions, breaking tasks into steps, and using the assistant to support—not replace—thinking.

Another important role is **monitoring learning and emotional responses (**Spadavecchia & Giovannella, 2010, July). Voice assistants can give instant feedback or read instructions, but teachers observe whether students truly understand the material and whether the AI output is appropriate, accurate, and non-frustrating. Teachers also maintain a safe environment by managing privacy, ensuring sensitive information is not shared with the device, and addressing barriers such as misrecognition of speech or cognitive overload.

Teachers also act as **instructional designers (**Rogers, 2002). They create learning scenarios where voice assistants are embedded into inquiry activities, routines, or problem-solving tasks. For example, a teacher might design a reading activity where the assistant reads a passage aloud, asks comprehension questions, and helps students dictate answers. Another scenario may involve using reminders and schedules to build independence for students with executive-functioning challenges. Teachers ensure that AI supports individual education plans (IEPs) and aligns with curriculum goals.

Regarding pedagogical models, several frameworks are especially supportive.

The **Universal Design for Learning (UDL)** model (Katz, 2013) is highly compatible with voice assistants. UDL encourages offering multiple means of engagement, representation, and expression. Voice assistants provide auditory representation, alternative expression through speech, and personalized engagement through conversational support.

A **scaffolded learning** model is also effective. Voice assistants can break instructions into smaller steps, offer hints, and repeat information as needed. Teachers design the scaffold and gradually remove support as students gain independence.

The **assistive technology integration model (SETT Framework: Student, Environment, Tasks, Tools)** (De Freitas et al., 2022) helps teachers evaluate whether voice assistants truly fit a student's needs. This structured approach ensures the technology is not used for its novelty but because it matches the learning environment and specific tasks the student must accomplish.

Constructivist and inquiry-based models (Urdanivia Alarcon at al., 2023) can be enhanced by conversational AI. Students can explore topics by asking the assistant questions, receiving explanations, and discussing concepts. Teachers guide inquiry, encourage critical evaluation of answers, and connect AI-generated information to hands-on learning.

Finally, **co-regulation and metacognitive teaching** play an important role. Teachers help students use voice assistants to plan work, monitor progress, and reflect on learning—skills essential for students with learning or executive-functioning difficulties.

In all models, the teacher remains the strategist who ensures that AI augments accessibility, strengthens independence, and empowers students while maintaining human-centered, ethical, and pedagogically sound learning conditions.

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SCENARIO 4. Educational platforms with AI functionalities

Introduction to the Scenario

The scenario "Accessibility Infrastructure, Inclusive Assessments & Ethical Considerations" is discussed by Kaunas University of Technology researchers. To truly realize inclusive education, AI must be embedded into the infrastructure: accessible materials (audio, captioning, image descriptions), sign language avatars or interfaces, flexible display and control settings. AI-driven assessment tools can offer multiple means of expression (respond by speech, picture, gesture) so that students can demonstrate competence regardless of disabilities that hamper reading or writing. At the same time, the ethical, privacy, fairness, and bias issues must be addressed. For instance, datasets for speech recognition often underrepresent non-standard speech or disabled voices; AI models may misinterpret or fail to recognize atypical accents or articulation; structural inequities in access to devices and internet affect implementation. Professionals emphasise participatory design — involving students with disabilities, caregivers, teachers — and grounding AI interventions in frameworks of rights and capability to ensure technology supports rather than marginalizes

The aim of the Scenario

The aim is to discuss AI-driven assessment tools can offer multiple means of expression (respond by speech, picture, gesture) so that students can demonstrate competence regardless of disabilities that hamper reading or writing

AI Tool(s) Description

For Inclusive Education

- Accessibility & Differentiation: Each platform uses AI to reduce barriers — whether through speech, simplified text, or engagement-sensitive interactions.
- Personalized Support: AI enables adaptive feedback, scaffolded learning, and self-paced progression that traditional one-size-fits-all instruction often fails to deliver.
- Independence: Students with learning disabilities, mobility challenges, or sensory impairments can engage more autonomously.

- **Teacher Empowerment**: Tools like Khanmigo help teachers free up time, while AccessiLearnAI allows for human-validated customization.
- **Cognitive Support**: Neuroadaptive systems like NeuroChat can support regulation and reduce overload, benefiting learners with attention or executive-function challenges.

1. Khan Academy / Khanmigo

What it is:	Khan Academy is a well-known free learning platform; **Khanmigo** is its AI-powered tutor and teaching assistant. khanmigo.ai+2khanmigo.ai+2
AI functionality:	Khanmigo uses generative AI (GPT-4) to guide students through problems instead of just giving answers. It asks questions, prompts critical thinking, explains concepts, and creates writing feedback. khanmigo.ai For teachers, it helps generate lesson ideas, rubrics, and progress reports. khanmigo.ai+1
Inclusive education benefits:	– Supports students who need more scaffolding or repeated explanations. – Helps learners who struggle with traditional textbook-based instruction by providing conversational, adaptive help. – Reduces anxiety: students can ask as many questions as they like, without judgment, building confidence. – Assists teachers by freeing up time, enabling them to focus more on differentiated instruction and direct support.

2. Read&Write by Texthelp

What it is:	A literacy support platform designed to help students with reading, writing, comprehension, and studying. Texthelp
AI functionality:	– **Text-to-speech:** reads text aloud to the student, highlighting as it goes. Texthelp – **Speech-to-text ("Talk & Type"):** lets students dictate text. Texthelp – **Rewordify / Simplify:** simplifies complex text to make it more understandable. Texthelp – **Predictive writing / vocabulary tools:** helps with word prediction, definitions, and usage. Texthelp

Inclusive education benefits:	– Extremely helpful for students with dyslexia, ADHD, or those who struggle with spelling and grammar — they can listen to text instead of decoding. – Supports students who have motor difficulties or fine-motor control challenges, by using speech input instead of typing. – Aids comprehension for students who find reading difficult: simplified text, definitions, and audio support make content more accessible. – Promotes independence: students can use Read&Write across devices (Windows, Mac, iPad, Android), enabling flexibility.

3. AccessiLearnAI

What it is:	An accessibility-first e-learning platform integrating AI to support learners with disabilities (Stelea et al., 2025).
AI functionality:	– Onthe-fly **text summarization** and **reading-level adaptation** so content becomes easier to understand for different learners. – **Text-to-speech** and semantic structuring to make content compatible with screen readers. – Automatic **alternative text generation** for images, making visuals accessible for visually impaired students. – Language translation for multilingual learners.
Inclusive education benefits:	– Designed with “human-in-the-loop”: teachers review and validate AI-generated adaptations, ensuring pedagogical correctness and trust. – Especially useful for blind or visually impaired learners, enabling full access to lessons via audio or structured HTML. – Helps students with reading difficulties by adapting complexity and summarizing. – Supports digital equity by combining offline (PWA) functionality and accessibility features.

4. NeuroChat (Neuroadaptive AI)

What it is:	A cutting-edge, research-driven AI chatbot that adapts to a learner’s cognitive engagement in real time (Baradari et al., 2025).

AI functionality:	– Integrates **EEG-based engagement monitoring**, so the system can "sense" how attentive or cognitively loaded a student is. – Dynamically adjusts **the complexity, response style**, and pacing of interactions based on the student's engagement level.
Inclusive education benefits:	– Ideal for students with attentional challenges (e.g., ADHD) — conversation adapts to when they are losing focus. – Helps avoid cognitive overload by tailoring responses in real-time to the student's mental state. – Provides a more personalized, adaptive tutor that not only reacts to correct/incorrect answers, but also to how engaged the student is. – Encourages self-awareness: students could potentially learn to recognize their own engagement and request breaks or clarifications

5. Audemy

What it is:	A platform recently described in research for providing **audio-based, adaptive learning for blind or visually impaired students** (Yang et al., 2025).
AI functionality:	– Adapts content based on **student accuracy**, **pace preferences**, and **engagement patterns**. – Uses **text-to-speech** to deliver all content, making lessons fully auditory. – Includes reinforcement and motivational feedback adapted to each learner's needs.
Inclusive education benefits:	– Empowers blind and low-vision learners with an interactive, responsive learning environment. – Personalizes learning pace so students don't feel rushed or left behind. – Maintains motivation through tailored feedback and reinforcement. – Compatible with existing assistive technologies (e.g., screen readers), ensuring it complements what students already use.

How AI Supports Students

The five AI-enabled educational platforms—Khan Academy/Khanmigo, Read&Write, AccessiLearnAI, NeuroChat, and Audemy—provide multiple forms of support for students with special needs, each addressing diverse accessibility, cognitive, and learning challenges. These platforms leverage AI to make learning more inclusive, adaptive, and personalized, ensuring that students with disabilities can access content, practice skills, and engage with lessons independently.

Khan Academy / Khanmigo offers AI-powered tutoring that guides students through exercises and questions without simply providing answers. For students with learning disabilities, dyslexia, or attention difficulties, this conversational support scaffolds understanding by prompting thinking, breaking down problems, and offering step-by-step guidance. By allowing repeated interaction without judgment, it builds confidence and reduces anxiety. Teachers benefit from AI-generated lesson suggestions and feedback, freeing them to provide individualized support. Khanmigo's ability to adjust explanations based on student responses helps learners with varying comprehension levels, supporting differentiated instruction.

Read&Write by Texthelp focuses on literacy support and accessibility. Its text-to-speech function allows visually impaired students or those with reading difficulties to access written content audibly, while speech-to-text enables students with motor impairments or dysgraphia to dictate assignments and take notes. Vocabulary support, predictive writing, and text simplification tools assist students with dyslexia, language processing difficulties, or non-native speakers. By enabling independent reading, comprehension, and writing, Read&Write reduces reliance on human aides and promotes autonomy, allowing learners to participate more fully in classroom activities.

AccessiLearnAI provides adaptive learning by automatically adjusting content readability, summarizing materials, generating alternative text for images, and translating content. These functions are particularly beneficial for students with visual impairments, cognitive challenges, or multilingual backgrounds. The platform ensures that complex materials are presented in simpler forms while preserving instructional intent, allowing learners to access the same curriculum as peers. Teachers maintain oversight through human-in-the-loop verification,

ensuring that adaptations remain pedagogically accurate. By combining accessibility and AI-driven personalization, AccessiLearnAI promotes equity and engagement for all learners.

NeuroChat introduces cognitive-adaptive tutoring by monitoring engagement and adjusting interaction style, pace, and content complexity in real time. This is especially valuable for students with ADHD, autism, or executive-functioning challenges, who may struggle with maintaining attention or processing information at standard pace. NeuroChat's AI identifies when learners are overloaded or distracted and modifies responses accordingly, supporting sustained focus, reducing frustration, and improving learning outcomes. By adapting to both cognitive and behavioral cues, it ensures that students receive guidance tailored to their moment-to-moment needs, complementing teacher instruction.

Audemy focuses on auditory learning, delivering content entirely through text-to-speech while personalizing pace, reinforcement, and feedback. This approach is ideal for blind or visually impaired students, as well as those with reading difficulties or learning disabilities. By adjusting lessons to individual performance and engagement, Audemy fosters comprehension, retention, and motivation. Its integration with assistive technologies ensures continuity across learning environments and supports independence.

Overall, these platforms enhance inclusion by providing multiple modes of content representation, personalized scaffolding, and interactive support. They reduce barriers associated with visual, motor, cognitive, or reading challenges and empower students to participate actively in learning. By complementing teacher guidance, these AI tools allow students with special needs to access curricula effectively, practice skills independently, and develop confidence, autonomy, and self-regulation, forming the foundation for equitable educational experiences.

Teacher's Role and pedagogical models suggested to use

In inclusive education, teachers play a pivotal role in bridging the gap between technology, curriculum, and student needs. While AI and digital platforms provide accessibility and adaptive support, teachers remain central to designing meaningful learning experiences, monitoring progress, and fostering engagement. Their role extends beyond delivering content to acting as facilitators, guides, and advocates for each student's unique needs.

One key responsibility is **orchestrating accessibility**. Teachers select appropriate AI tools and configure them for each learner, adjusting voice output, reading speeds, and input methods to accommodate sensory, motor, or cognitive differences. They model how to interact with voice assistants, speech-to-text applications, and other adaptive technologies, ensuring students understand how to use them effectively and independently. Teachers also teach students strategies for asking clear questions, breaking tasks into manageable steps, and leveraging AI to scaffold learning rather than replacing critical thinking.

Another critical role is **monitoring learning and emotional responses**. Teachers assess whether students comprehend the material, if the AI output is appropriate, and whether learners feel supported rather than overwhelmed. They safeguard privacy, manage potential misinterpretations by speech recognition tools, and prevent cognitive overload. Teachers act as interpreters of AI feedback, helping students make sense of responses, reflect on learning, and apply insights in practical contexts.

Teachers are also **instructional designers**. They integrate AI tools into lessons, crafting scenarios where adaptive technologies enhance problem-solving, reading comprehension, writing, or daily routines. For example, students may use a voice assistant to navigate reading materials, dictate answers, receive reminders, or manage schedules. Teachers ensure that these technologies align with curriculum goals and individualized education plans (IEPs), creating personalized and equitable learning experiences.

Several pedagogical models support inclusive education with AI integration:

- **Universal Design for Learning (UDL):** UDL emphasizes providing multiple means of engagement, representation, and expression. AI tools facilitate auditory learning, multimodal content delivery, and adaptive feedback, allowing teachers to meet diverse learning styles and abilities.
- **Scaffolded Learning:** Teachers use AI to provide step-by-step guidance, hints, and repetition. This gradual support helps students master skills independently over time, reducing reliance on human prompts while fostering competence.
- **Assistive Technology Integration (SETT Framework):** By analyzing Student, Environment, Tasks, and Tools, teachers ensure that AI technologies are applied purposefully to meet individual needs rather than being used for novelty or convenience.

- **Constructivist and Inquiry-Based Models:** Teachers encourage exploration and problem-solving, using AI to simulate dialogue, provide explanations, or guide investigations. This approach nurtures active learning, critical thinking, and engagement while respecting each learner's pace.
- **Co-Regulation and Metacognitive Strategies:** Teachers help students plan, monitor, and reflect on learning using AI support. Voice assistants and adaptive platforms can provide reminders or feedback, but teachers coach students to self-regulate and develop independent strategies.

In all these models, the teacher ensures that AI enhances rather than replaces human interaction, making learning accessible, personalized, and empowering. By combining pedagogical expertise with AI functionalities, teachers support students with disabilities to engage fully, develop autonomy, and achieve meaningful learning outcomes.

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II. AI Tools Supporting Students with Sensory Disabilities

Introduction to the Topic II

AI tools that support students with sensory disabilities are one of the most transformative applications of artificial intelligence in higher education. Combining computer vision, natural language processing and adaptive learning systems, these technologies remove the communication and perception barriers faced by students with visual or hearing impairments. Screen readers, sign language translators, image magnification tools and audio description systems provide equitable access to digital and physical learning environments by converting visual or auditory information into perceivable formats.

Integrating these AI-driven solutions into teaching and campus life enables universities to foster a genuinely inclusive educational experience, where all students can engage with materials, participate in discussions and demonstrate their knowledge independently, regardless of sensory ability. These tools enhance accessibility and encourage innovation in pedagogy by promoting the principles of Universal Design for Learning (UDL) and advancing the goal of fully inclusive higher education.

SCENARIO 5. Screen readers converting text to speech or Braille

Introduction to the Scenario

Automatic sign language translation systems are among the most innovative applications of artificial intelligence in inclusive higher education. These technologies aim to bridge the communication gap between deaf or hard of hearing students and the academic environment by converting sign language into written or spoken text, and vice versa. Using a combination of computer vision, natural language processing (NLP) and machine learning, these systems analyse hand gestures, facial expressions and body movements in real time to produce accurate translations.

In a university setting, these AI-powered tools can enhance lectures, online courses, and administrative interactions by offering instant access to spoken communication and empowering students to fluently express themselves in sign language. They reduce reliance on human interpreters and promote autonomy, inclusivity and equal participation in academic life. As this technology continues to evolve, automatic sign language translation systems have the potential to become a cornerstone of accessible education within multilingual and multicultural academic environments.

The integration of such technologies aligns with the European Accessibility Act and universities' commitments to inclusive education, enabling all learners to engage with academic content on an equal footing.

The aim of the Scenario

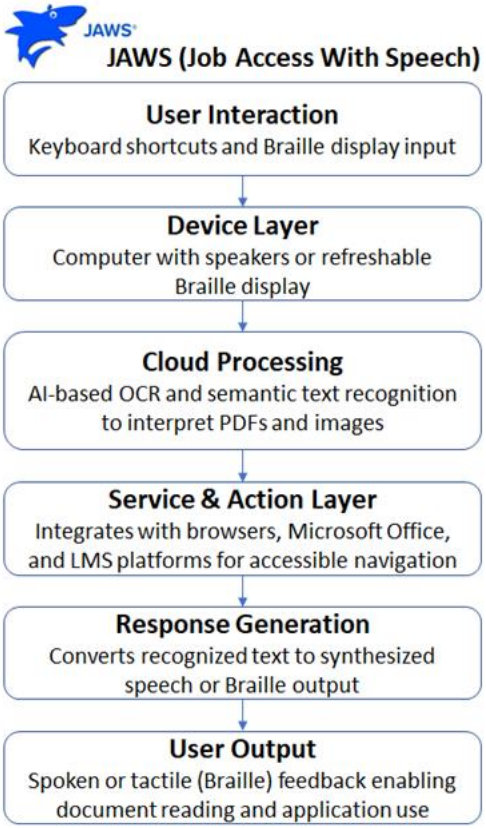
This scenario aims to demonstrate how AI-powered screen readers can improve digital accessibility for visually impaired students by converting text into speech or Braille. This enables them to participate equally in academic learning and assessment processes.

AI Tool(s) Description

1. JAWS (Job Access with Speech)

Type:	AI-based screen reader and text-to-speech converter.

Website:	https://www.freedomscientific.com/products/software/jaws/



General Information:

JAWS is one of the world's most widely used screen readers for visually impaired and blind users. It converts on-screen text into synthesized speech or Braille output, allowing seamless navigation of digital content, websites, and software applications.

Developer:

Developed by Freedom Scientific, part of Vispero Group, USA.

Support provided:

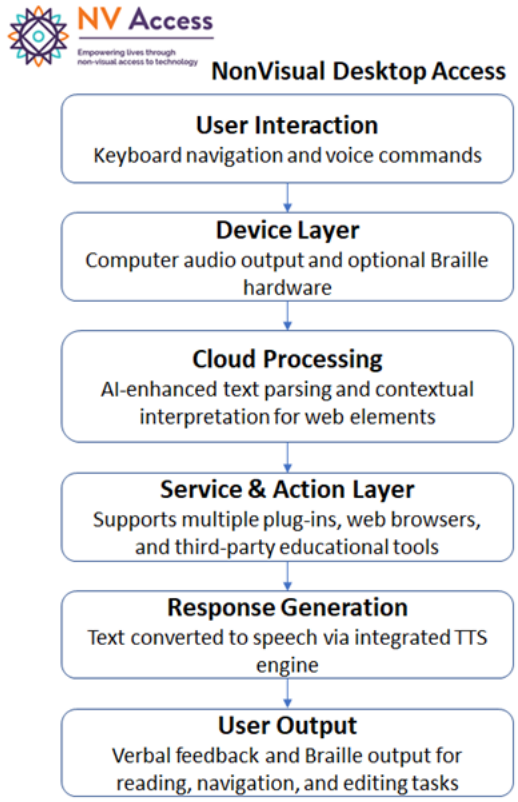
It enables blind and visually impaired students to read and navigate digital content by converting text and on-screen information into synthesised speech or Braille. It also supports document editing, web browsing and access to learning management systems.

Usage and Licensing:

JAWS is a commercial software product, available through individual or institutional licenses. Discounts and educational packages are available for schools and universities supporting inclusive learning environments.

2. NVDA (NonVisual Desktop Access)

Type:	Open-source screen reader with AI-enhanced contextual navigation.
Website:	https://www.nvaccess.org/



General Information:

NVDA is one of the most accessible and flexible free screen readers. Its AI modules enhance pronunciation accuracy and web content interpretation, making it ideal for academic use.

Developer:

NV Access Limited (Australia)

Support provided:

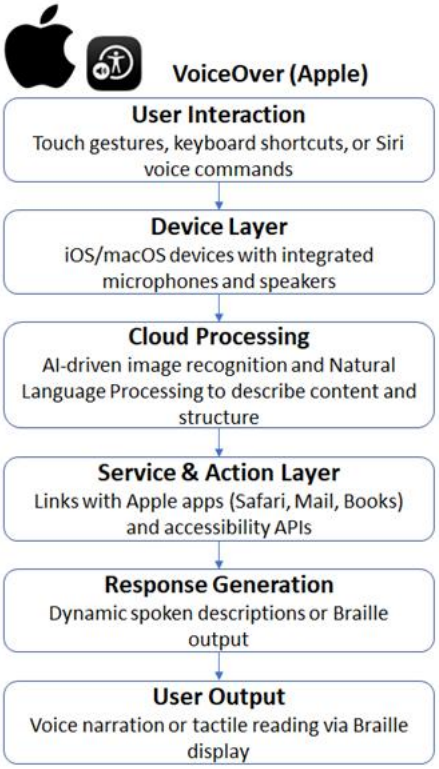
Offers blind and low-vision students free access to digital materials through synthesized speech and Braille output. NVDA reads text in applications, browsers, and PDF files while maintaining accuracy in multilingual environments.

Usage and Licensing:

Free and open-source (GNU GPL License).

3. VoiceOver (Apple)

Type:	Built-in AI-driven screen reader and accessibility suite.
Website:	https://www.apple.com/accessibility/features/?vision



General Information:

VoiceOver integrates AI-based image recognition and contextual interpretation. It is particularly effective for users within the Apple ecosystem, providing seamless access to academic resources.

Developer:

Apple Inc. (USA)

Support provided:

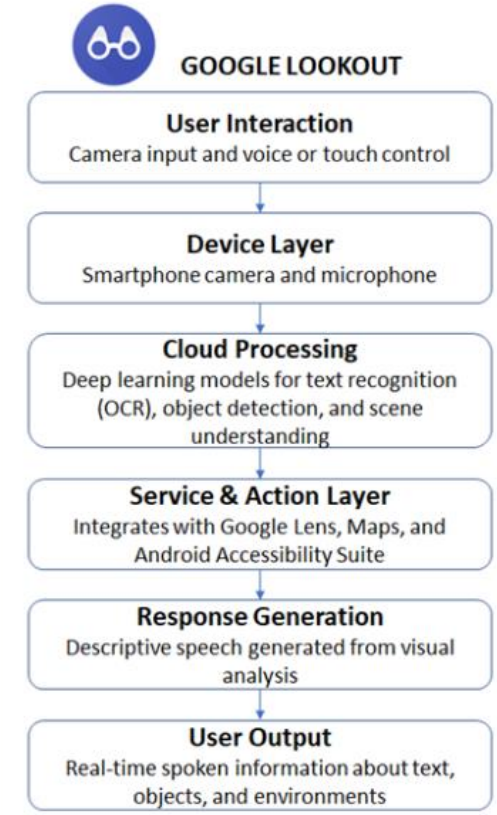
Helps visually impaired students navigate Apple devices, read study materials, access educational apps, and interact with online learning environments through speech or Braille feedback.

Usage and Licensing:

Built-in, free accessibility feature on all Apple devices.

4. Google Lookout

Type:	AI-powered visual recognition and real-time narration app.
Website:	https://play.google.com/store/apps/details?id=com.google.android.apps.accessibility.reveal&pli=1



General Information:

Lookout applies deep learning and OCR technology to identify scenes, food labels, documents, and handwritten text, helping students navigate both academic and everyday environments independently.

Developer:

Google LLC (Accessibility Division, USA)

Support provided:

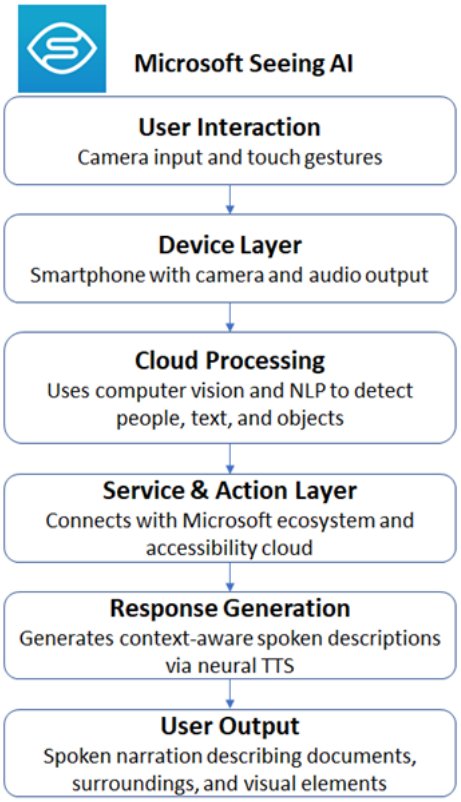
Assists students with visual impairments by describing their surroundings, reading documents, identifying objects, and providing text recognition via camera input

Usage and Licensing:

Free on Android devices; requires Google account.

5. Microsoft Seeing AI

Type:	AI-based visual recognition and text narration mobile application.
Website:	https://www.seeingai.com/



General Information:

Seeing AI combines neural networks and natural language processing to offer real-time spoken feedback. It can read printed materials, recognize people, and describe complex visual scenes.

Developer:

Microsoft Corporation (AI for Accessibility Program, USA)

Support provided:

Empowers students with low vision or blindness by converting visual information—text, faces, and environmental cues—into audio descriptions. Enhances classroom participation and independent learning.

Usage and Licensing:

Usage and Licensing: Free for iOS devices; multilingual support.

How AI Supports Students

Artificial intelligence can greatly improve the accessibility and usability of digital learning environments for students with sensory disabilities, especially those who are blind or have low vision. AI-driven screen readers and recognition systems bridge the gap between visual information and meaningful understanding by automatically converting digital text, images and complex layouts into audio or tactile (Braille) formats.

Modern screen readers, such as JAWS, NVDA and VoiceOver, use natural language processing (NLP) and neural text-to-speech (TTS) technologies to interpret the structure and meaning of on-screen content. Rather than reading words mechanically, these systems use AI to identify headings, tables, hyperlinks and contextual cues, providing a logical and coherent reading experience. They can also adapt the tone, rhythm and language of the voice to the user's preferences, thereby increasing comprehension and reducing cognitive fatigue. Braille display

integration enables direct tactile reading, ensuring full inclusion for students who rely on non-auditory channels.

AI-based mobile applications such as Google Lookout and Microsoft Seeing AI extend these capabilities beyond static reading. They use deep learning models to recognise objects and scenes, transforming visual environments into auditory descriptions. For example, when navigating campus buildings, students can receive real-time spoken feedback about nearby doors, lifts, or printed signs. In academic settings, these tools can interpret printed handouts, handwritten notes or PowerPoint slides by automatically detecting text and reading it aloud or converting it into an accessible digital format.

Furthermore, integrating AI into screen readers enhances independent learning. Students can explore e-books, scientific articles and online resources independently. These tools support multiple languages and offer features such as automatic translation and pronunciation adjustment, which are particularly beneficial in international higher education contexts.

AI also improves interaction with digital learning management systems (LMS) and administrative systems. Smart algorithms can identify unlabelled buttons or inaccessible elements and provide alternative descriptions or navigation shortcuts. Some systems even use predictive modelling to anticipate user needs, such as suggesting navigation paths or automatically skipping redundant elements.

Furthermore, AI supports personalised accessibility by learning from user behaviour and adapting to preferred reading speed, voice type and command style. They can detect when a user is struggling with content and offer alternative ways to access the same information (e.g., an audio summary or a Braille transcription).

Overall, AI-based screen readers and visual recognition tools promote inclusive education by removing barriers to accessing information, fostering autonomy and enabling equal participation in academic and social university life. These tools are intelligent partners that continuously evolve, learning from user feedback and new accessibility standards to ensure that every student, regardless of sensory ability, can fully engage in learning and communication.

Teacher's Role and pedagogical models suggested to use

The effective implementation of AI-based screen readers in higher education requires the coordinated efforts of the entire academic community, including teachers, administrative staff and institutional leaders. Successful inclusion requires the adoption of appropriate technology, as well as the creation of an educational culture that values accessibility, flexibility and equal participation for all students.

At the institutional level, the Universal Design for Learning (UDL) framework provides a foundation for the design of accessible courses. Universities are encouraged to make learning materials available in multiple formats — digital, audio and tactile — and ensure that all teaching content complies with accessibility standards. This includes structured documents with defined heading hierarchies, alternative text for images, and tables that can be interpreted by screen readers. AI-based accessibility checkers integrated into tools such as Microsoft Word or Learning Management Systems (LMS) can automatically help staff identify and resolve potential accessibility issues before materials are published.

In the teaching process, academic staff facilitate inclusive learning rather than providing adaptations alone. When using screen reader tools such as JAWS, NVDA or VoiceOver, educators can help ensure that students with visual impairments are able to follow lectures and discussions at the same pace as their peers. This involves providing clear verbal descriptions of visual materials (e.g., graphs or diagrams), offering text-based lecture notes and providing captions or transcripts for recorded content. In some contexts, AI-powered tools such as Google Lookout or Microsoft Seeing AI can be integrated into learning activities, enabling students to work independently in laboratory or field settings.

From a pedagogical perspective, models such as the Social Constructivist Approach and Collaborative Learning frameworks play a key role. These promote interaction, peer support and mutual understanding among students with diverse abilities. Inclusive group work, supported by AI technologies, fosters a sense of belonging and active participation.

Blended learning and flipped classroom models further enhance accessibility when combined with AI-based assistive tools. Providing pre-recorded lectures, structured e-learning modules and captioned multimedia materials enables students who use screen readers to learn at their own pace and revisit complex topics as required.

Continuous professional development is also crucial. Universities should offer regular training sessions on digital accessibility, inclusive pedagogy and the use of AI in education. These initiatives empower teaching and administrative staff alike to confidently and consistently apply inclusive principles.

By collaborating with disability support offices and ICT specialists, higher education institutions can ensure that digital transformation leads to true accessibility, turning technological innovation into a means of enabling academic equity and student empowerment.

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SCENARIO 6. Systems for automatic sign language translation into text and vice versa

Introduction to the Scenario

Automatic sign language translation systems are a significant step towards fully including deaf and hard of hearing students in higher education. These AI-driven solutions use computer vision and natural language processing (NLP) alongside deep learning to recognise and interpret sign language gestures, translating them into text or speech – and vice versa. By processing visual inputs such as hand movements, facial expressions and body posture, these systems facilitate real-time bilingual communication between sign language users and hearing individuals.

In a university setting, these technologies can transform classroom communication, administrative interactions and online learning experiences. They can provide an immediate translation of lectures, support hybrid or remote participation, and facilitate access to academic content, reducing the need for constant human interpretation. AI-based systems are helping to bridge communication gaps and empower students to engage independently in discussions and academic life.

While these tools are still evolving, they demonstrate how artificial intelligence can contribute to accessibility, language inclusion, and universal participation in higher education, thereby aligning with the broader goals of the UN Convention on the Rights of Persons with Disabilities and the European Accessibility Act.

The aim of the Scenario

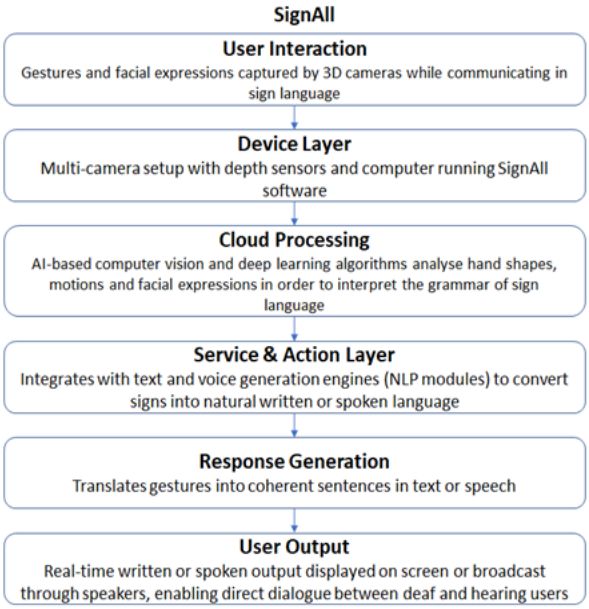
This scenario aims to demonstrate how AI-based automatic sign language translation systems can improve accessibility and interaction for deaf and hard-of-hearing higher education students by facilitating real-time, two-way communication and inclusive participation in learning activities.

AI Tool(s) Description

1. SignAll

Type:	Automatic sign language to text/speech translation system.

Website:	https://cordis.europa.eu/article/id/411590-first-system-to-automatically-translate-sign-language



General Information:

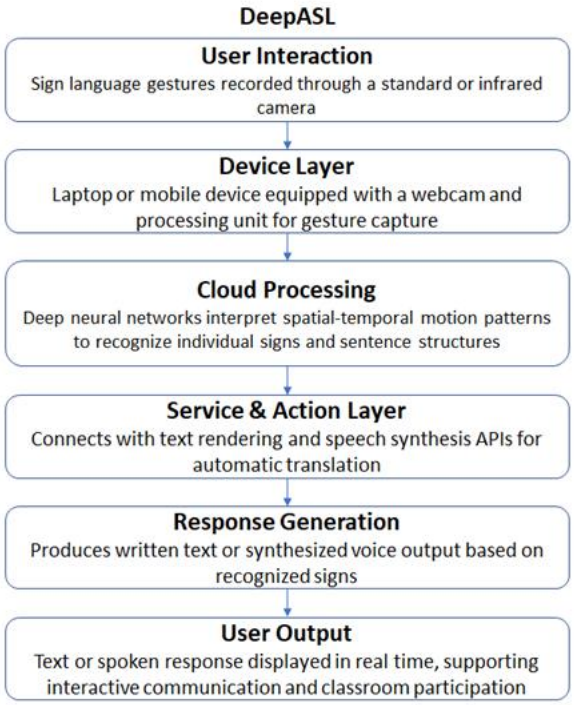
SignAll is an innovative translation system based on artificial intelligence and designed to translate sign language into other languages and start improving the quality of life for the hard-of-hearing. The Horizon 2020 grant (Grant agreement ID: 854984) allowed for localising the SIGNALL project for the EU market. The SignAll system allows for direct, seamless and automated translation between deaf and hearing people, without the need for a human translator. It is the first software-hardware solution developed in the world and is already heading to market.

Support provided:

Enables real-time communication between deaf signers and hearing users without human interpreters.

2. DeepASL

Type:	AI sign language recognition and translation system.



General Information:

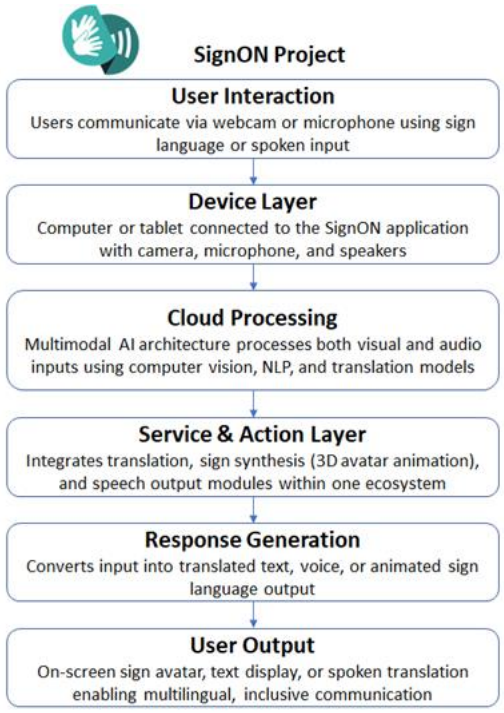
DeepASL is a sign language translation technology developed by researchers at Michigan State University, to translate sign language gestures into text using standard cameras, without wearable sensors. It employs deep learning models to recognize signs and sentences in real time, enhancing accessibility for deaf individuals in educational environments.

Support provided:

Provides direct translation from visual sign input to readable text for classroom participation, lectures, and meetings.

3. SignON

Type:	Multimodal sign-spoken translation platform
Website:	https://signon-project.eu/



General Information:

SignON is a large-scale European initiative developing AI-based translation between spoken and sign languages. The system integrates computer vision, natural language understanding, and 3D avatar synthesis to enable multilingual, multimodal communication.

Developer:

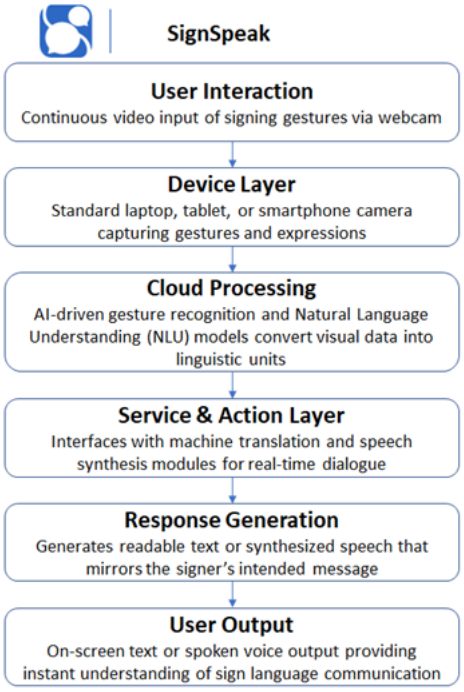
Consortium led by Dublin City University (Ireland), funded under the EU Horizon 2020 program.

Support provided:

	Provides bidirectional translation between sign and spoken languages across multiple European sign languages.

4. SignSpeak

Type:	AI-based bidirectional sign language translation and communication platform
Website:	https://sign-speak.com/



General Information:

SignSpeak is an AI-driven communication platform designed to translate American Sign Language (ASL) into spoken or written English and vice versa. The system uses computer vision and natural language processing (NLP) to analyze sign gestures, facial expressions, and body movement in real time. The reverse translation employs AI-generated 3D avatars to render English text or speech into sign language. The tool supports seamless integration with web applications, learning management systems, and conferencing platforms for inclusive communication.

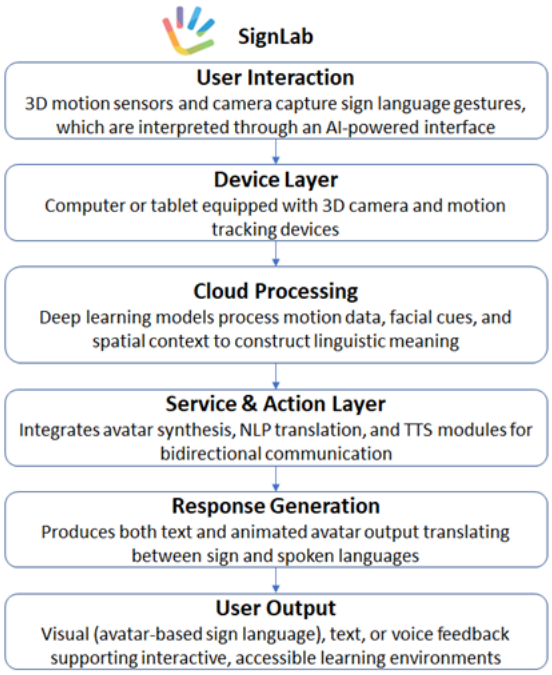
Support provided:

Facilitates real-time translation between sign language users and non-signers in educational and administrative contexts. Supports accessibility during lectures, online meetings, and student–staff interactions. Enables inclusion in both physical and virtual learning environments by providing text, voice, or avatar-based sign translation.

5. SignLab

Type:	AI-based bidirectional translation with 3D avatars

Website:	https://www.signlab.co/



General Information:

SignLab AI is an innovative UK-based platform using 3D motion capture, neural translation models, and avatar technology to enable two-way translation between sign and spoken languages. It emphasizes educational accessibility and cross-platform usability. Its integrated videos help users acquire the hand shapes, body language and spatial representation needed to sign fluently, while our AI ensures that signs are not only learnt, but retained over time.

Support provided:

Translates between sign language and speech/text, providing visual avatars for comprehension in lectures and online learning.

How AI Supports Students

AI-based systems for the automatic translation of sign language play a transformative role in making higher education more equitable and accessible for students with hearing impairments. These technologies act as mediators between sign language users and the predominantly spoken or written communication modes used in universities. Such systems use deep learning, computer vision and natural language processing (NLP) to enable real-time translation between sign language and text or speech. This reduces the communication barriers that often limit participation in academic and social contexts.

Multimodal neural networks, trained on large datasets of signed gestures, hand shapes, facial expressions and body postures, lie at the core of these solutions. Computer vision algorithms detect spatial-temporal motion patterns and translate them into linguistic units using semantic mapping. The reverse process uses natural language generation and avatar-based sign synthesis to present spoken or written information in sign language. This bidirectional model

supports both comprehension and expression, ensuring deaf students can actively participate in lectures, discussions and administrative communications.

In practice, tools such as SignAll, SignSpeak, and SignON provide automatic translation interfaces for the classroom and online learning environments. When integrated into videoconferencing tools such as Zoom or MS Teams, they can immediately translate spoken language into sign language via AI-generated avatars or text captions. Conversely, deaf students can communicate via their webcam, with their gestures being translated into text or synthesised speech for hearing peers or instructors. This enables inclusive participation in real time, eliminating the need for constant human interpretation.

Beyond accessibility, AI promotes autonomy and self-paced learning. Students can use sign translation systems to independently review course content, request sign language clarification and receive immediate text or spoken feedback. This supports academic performance and reduces reliance on external interpreters, empowering students to manage their studies more flexibly. Furthermore, AI-driven personalisation enables the system to adapt to different sign variants and individual signing styles, thereby increasing the accuracy and naturalness of the translation.

From an institutional perspective, AI-supported translation promotes inclusion by facilitating ongoing communication between students with varying degrees of hearing loss or deafness and administrative offices. For instance, students can submit requests or receive feedback via automated translation platforms, eliminating the need to schedule an interpreter. This approach supports privacy, immediacy and independence in communication.

AI-driven sign language translation tools are a significant step towards making higher education universally accessible. They complement the work of human interpreters, filling gaps in availability and coverage. Strategically integrating these systems into teaching, communication and digital infrastructure allows universities to create a more inclusive academic environment, where language is no longer a barrier to participation, learning or community engagement.

Teacher's Role and pedagogical models suggested to use

Integrating AI-based systems for automatic sign language translation into higher education requires a balanced, rights-based pedagogical approach. Rather than replacing human

interpreters or educators with AI, universities should view AI as part of a broader 'Deaf Tech' ecosystem, where technology enhances accessibility while affirming the linguistic and cultural identity of deaf communities. Teachers should therefore act as mediators who ensure that technology supports inclusion, autonomy, and respect for communication diversity, rather than as mere users of these systems.

In this context, educators should adopt participatory and co-design pedagogical approaches, working directly with deaf students and accessibility specialists to evaluate and refine AI translation systems. This collaborative approach aligns with the Universal Design for Learning (UDL) framework, emphasising dialogue, trust and shared decision-making about the deployment of AI in the classroom. Teachers become facilitators of ethical technology use, ensuring that digital translation tools respect linguistic integrity and student autonomy.

AI-driven translation systems can support multimodal learning environments, where visual, textual and gestural information coexist. Teachers can integrate these tools into lectures, seminars, and hybrid classrooms, allowing students to select their preferred access method: live AI-based sign translation, text transcription, or recorded visual summaries. This flexibility reflects the freedom of choice principle discussed in current Deaf Tech research, which acknowledges that accessibility must accommodate individual preferences rather than impose uniform solutions.

From a pedagogical perspective, models such as Inclusive Blended Learning and Collaborative Multimodal Learning are particularly effective. These approaches encourage interaction between deaf and hearing students and are supported by AI translation tools that facilitate communication without erasing linguistic diversity. Teachers can design learning activities in which sign and spoken languages are used interchangeably with the support of AI tools, thereby normalising multilingual and multimodal education.

It is equally important to develop the AI literacy of academic staff continuously. Teachers should understand the capabilities and limitations of AI translation systems, be aware of potential biases in training data and adopt a critical stance towards the technology's output. Institutional training programmes should provide educators with ethical guidelines for AI use that are in line with the EU AI Act and UN CRPD Article 24 on inclusive education. This will ensure transparency and accountability, as well as the responsible integration of emerging technologies.

Universities must prioritise human oversight and empathy within AI-assisted communication. Although AI can facilitate access, human educators are still essential for interpreting context, emotion and nuance — dimensions that current algorithms cannot replicate. By combining AI-assisted translation with human interaction, universities can create pedagogical ecosystems that value innovation and human dignity.

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SCENARIO 7. Image magnification software

Introduction to the Scenario

Image magnification software is crucial in ensuring equal access to digital learning environments for students with visual impairments or low vision. These AI-assisted tools enlarge and enhance on-screen content, such as text, graphics and interfaces, allowing users to perceive details that would otherwise be inaccessible. Modern magnification systems offer more than just simple zooming, employing artificial intelligence to enhance images, optimise contrast and provide adaptive colour filtering that dynamically adjusts to user preferences and visual conditions.

In higher education, this software enables students to navigate digital learning platforms independently, read academic materials, participate in virtual laboratories and complete assessments. Integrating such software into institutional IT infrastructure supports compliance with accessibility standards (EN 301 549 and WCAG 2.2, https://www.etsi.org/deliver/etsi_en/301500_301599/301549/03.02.01_60/en_301549v030201p.pdf, https://www.w3.org/TR/WCAG22/), and promotes inclusive teaching practices. As AI-based magnification tools become more sophisticated, utilising machine learning to identify and emphasise essential visual elements, they bridge the gap between usability and accessibility. This empowers students with visual impairments or low vision to engage with complex academic content on an equal footing with their peers.

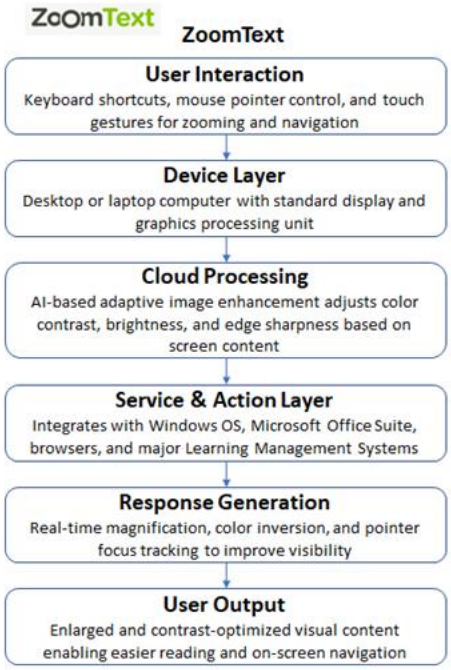
The aim of the Scenario

This scenario aims to demonstrate how AI-driven image magnification tools can enhance visual accessibility in higher education by improving clarity, adaptability and user autonomy, thus supporting inclusive teaching and learning for students with low vision.

AI Tool(s) Description

1. ZoomText

Type:	Advanced AI-powered screen magnification and enhancement software for users with low vision.



General Information:

ZoomText is a leading magnification and screen enhancement software developed by Freedom Scientific (Vispero Group), designed to assist users with low vision. It provides powerful screen magnification, color and contrast enhancement, and cursor/pointer customization to support easier navigation and reading.

Support provided:

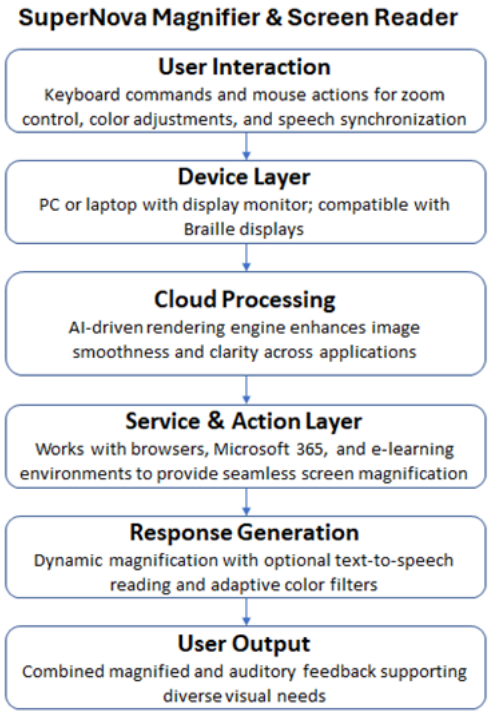
It assists visually impaired students by enlarging on-screen text, images, and user interface elements, improving visibility through adaptive color schemes and contrast modes. ZoomText also integrates speech feedback, enabling users to follow text as it is read aloud, particularly helpful during study, document editing, and online learning.

Usage and Licensing:

ZoomText is a paid product available through institutional and individual licenses, with academic and enterprise options.

2. SuperNova Magnifier & Screen Reader

Type:	Integrated magnification, speech, and Braille accessibility suite for visually impaired learners.



General Information:

SuperNova is an assistive technology suite by Dolphin Computer Access (UK) offering screen magnification, speech output, and Braille display compatibility in one platform. It supports users with various levels of visual impairment.

Support provided:

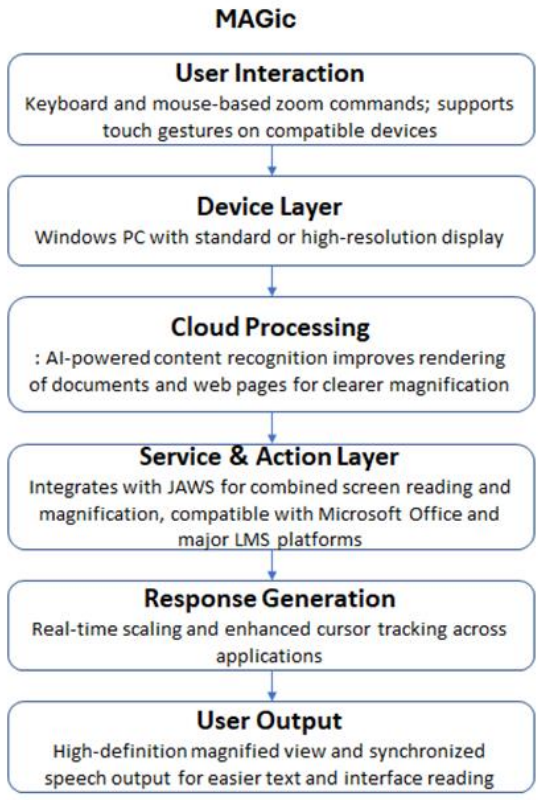
Enables students to magnify on-screen text and graphics, access content through synchronized speech, and use Braille displays for tactile reading. Its intelligent color and contrast settings improve comfort during long study sessions or digital content interaction.

Usage and Licensing:

Available through subscription or perpetual licenses for educational institutions, with multiple language options and technical support. More information: https://yourdolphin.com/supernova

3. MAGic

Type:	Screen magnification tool with speech feedback designed for educational and professional use.



General Information:

MAGic is a screen magnification software developed by Freedom Scientific that provides up to 60x magnification, speech feedback, and high-contrast enhancement to improve computer accessibility for individuals with low vision.

Support provided:

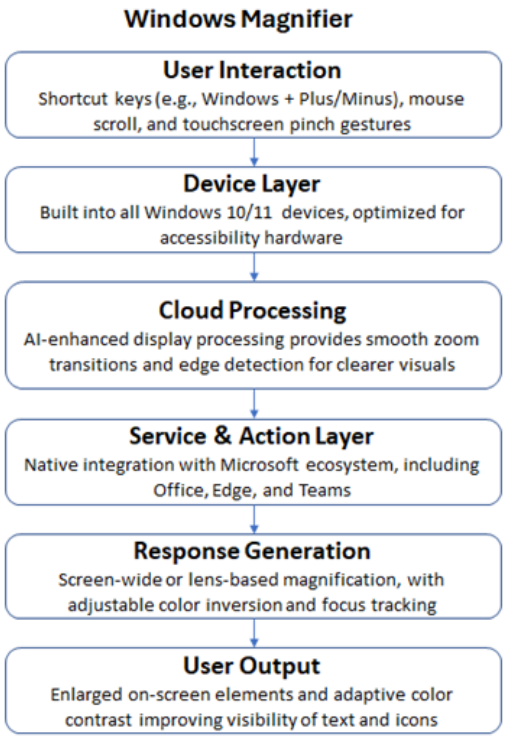
It helps students read documents, browse the web, and work within digital learning platforms by enlarging and clarifying text and visual elements. MAGic's integration with JAWS allows seamless transition between magnification and screen reading modes.

Usage and Licensing:

MAGic is commercially available for Windows, requiring an institutional or individual license. Academic discounts are available. More information: https://www.freedomscientific.com/products/magic/

4. Windows Magnifier

Type:	Screen magnification tool with speech feedback designed for educational and professional use.
Website:	https://support.microsoft.com/en-au/windows/use-magnifier-to-make-things-on-the-screen-easier-to-see-414948ba-8b1c-d3bd-8615-0e5e32204198



General Information:

Windows Magnifier is a built-in accessibility feature developed by Microsoft Corporation and included in Windows 10 and Windows 11 operating systems. It provides real-time screen magnification and visual enhancement for users with mild to moderate vision loss.

Support provided:

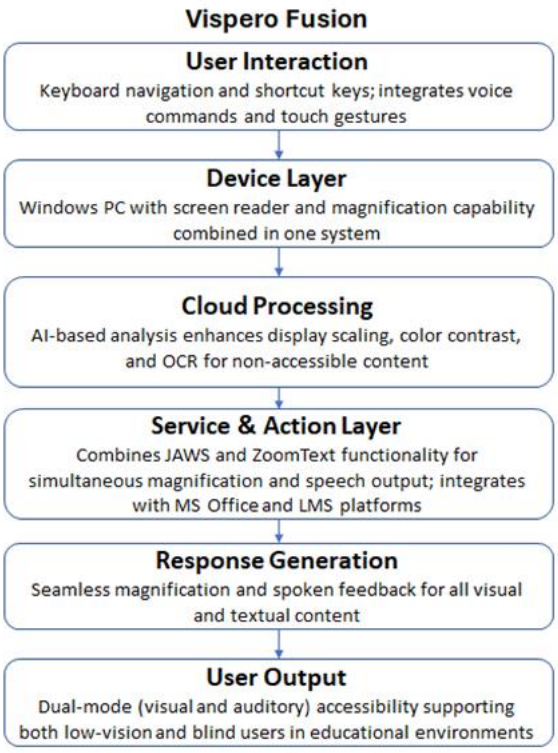
Allows students to zoom into text, images, and user interface elements while maintaining image clarity. It supports color inversion, lens mode, and tracking of the mouse pointer or text cursor for easier navigation of educational resources.

Usage and Licensing:

Free and pre-installed in Windows OS; available to all users without additional licensing. More information: https://support.microsoft.com/accessibility

5. Vispero Fusion

Type:	Combined screen reader and magnification solution offering dual sensory access for users with low or no vision.
Website:	https://www.freedomscientific.com/products/software/fusion/



General Information:

Fusion combines JAWS screen reader technology with ZoomText magnification into a unified platform developed by Freedom Scientific (Vispero Group). It is tailored for users who require both magnification and speech output simultaneously.

Support provided:

Provides dual sensory access through visual magnification and spoken feedback, enabling students with varying degrees of visual impairment to read, write, and navigate digital content independently. It enhances participation in virtual learning environments and document management tasks.

Usage and Licensing:

Fusion is a premium software available through institutional and personal licensing, with annual subscription or perpetual purchase options. More information: https://www.freedomscientific.com/products/fusion/

How AI Supports Students

AI technologies play a central role in improving the accessibility and usability of image magnification software. They transform it from a basic zooming tool into an intelligent, adaptive support system for visually impaired students. In an educational setting, AI-driven magnification tools such as ZoomText, SuperNova, MAGic, Windows Magnifier and Vispero Fusion enable visually impaired learners to interact more independently and efficiently with digital materials, online platforms and multimedia resources.

Modern magnifiers use AI-based visual processing to adjust the level of magnification, brightness and colour contrast dynamically depending on the type of content displayed. Text-heavy documents, for instance, are rendered with sharpened edges and optimised contrast, while complex images or diagrams are enhanced through intelligent smoothing and edge recognition. This adaptive enhancement minimises eye strain and enables users to maintain focus for longer study sessions — an essential factor for sustained academic performance.

Some magnifiers (e.g., SuperNova and Fusion) have AI-powered Optical Character Recognition (OCR) and semantic text recognition embedded, allowing students to access non-selectable or scanned text. The system automatically detects text regions within images, converts them into readable, editable text and can provide voice narration of this text if desired. In this way, even inaccessible PDFs or slides can be transformed into usable study materials.

Another AI-driven feature is context-aware zooming and navigation. Algorithms track the user's pointer, focus area or reading position to ensure magnification follows their workflow smoothly, whether they are reading a paragraph, filling out an online form or coding. This adaptive tracking reduces disorientation and improves orientation within the digital workspace.

Students working with interactive e-learning systems or online exams can benefit from tools such as ZoomText and Fusion, which use predictive assistance and screen region recognition to help users locate buttons, form fields and hyperlinks more quickly. The software can also detect layout changes and automatically adjust the zoomed view to the relevant section, reducing the need for manual scrolling and improving efficiency.

Furthermore, AI voice integration transforms magnifiers into multimodal learning companions. Tools such as Fusion and SuperNova offer synchronised magnification and text-to-speech output, enabling students to see and hear the content simultaneously. This dual-channel learning approach is supported by cognitive research as it enhances the comprehension and retention of students with partial vision loss or dyslexia.

In essence, AI-based image magnification software bridges the gap between accessibility and active participation, enabling learners to read digital textbooks, analyse diagrams, participate in online courses and complete assignments independently. These technologies embody the

core values of inclusive education, transforming digital barriers into adaptive learning opportunities.

Teacher's Role and pedagogical models suggested to use

For AI-based image magnification tools to be used effectively in education, teachers must be aware of accessibility needs and able to integrate these technologies into their daily teaching practices. Educators should ensure that all learning materials are provided in accessible digital formats and avoid using scanned or low-resolution images, as these limit OCR recognition. When creating slides or documents, teachers should use clear fonts, high contrast and structured layouts, as these are easier for AI magnifiers to interpret.

Teachers also play a key role in liaising with accessibility services to determine suitable magnification settings and combinations with screen readers (e.g., Fusion or SuperNova) for each student. During lessons, teachers should allow students to use their assistive software at a pace that suits them and share materials in advance so that AI tools can process and adapt them before sessions begin.

By offering multiple representations of information — visual, auditory and textual — teachers can make it easier for AI magnifiers to support students with diverse sensory needs. Combining blended learning and flipped classroom models also benefits learners using magnification tools, as they can review content at their own pace and in their preferred settings.

Teachers should be open to feedback and willing to make adjustments, communicating with students about which formats and teaching methods work best with their software. Small actions, such as verbally describing visual content or consistently structuring assignments, help to ensure that AI-based magnification tools enable equal participation in the learning process.

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SCENARIO 8. Audio description applications

Introduction to the Scenario

Audio description (AD) applications are AI-driven tools that translate visual information into spoken narration. This allows individuals with visual impairments to perceive and understand visual media such as videos, presentations and educational materials. In higher education, these tools are crucial for improving accessibility by describing visual elements, such as charts, gestures, images, and scenes, in real time or as pre-recorded narration. Modern AI-based systems use a combination of computer vision, natural language processing (NLP) and speech synthesis to automatically identify and describe key visual components. This technology is being integrated into an increasing number of learning management systems, video conferencing platforms, and digital libraries, helping universities to comply with accessibility standards such as WCAG 2.1 and the EU Web Accessibility Directive. By transforming visual learning into multisensory experiences, audio description applications enable students with visual impairments to participate in lectures, e-learning modules, and multimedia projects alongside their peers.

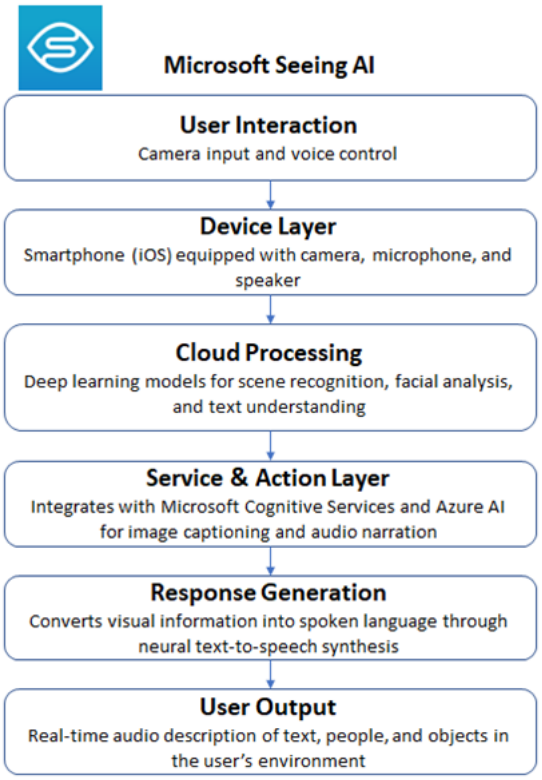
The aim of the Scenario

This scenario aims to demonstrate how AI-based audio description tools can enhance accessibility and inclusion in higher education by converting visual academic content into meaningful auditory information. This enables visually impaired students to participate fully in visual learning activities and multimedia coursework.

AI Tool(s) Description

1. Microsoft Seeing AI

Type:	AI-powered mobile audio description and object recognition app.
Website:	https://www.seeingai.com/



General Information:

Developed by Microsoft, Seeing AI is a free iOS app designed to help visually impaired users identify people, objects, text and scenes using AI-based computer vision.

Support provided:

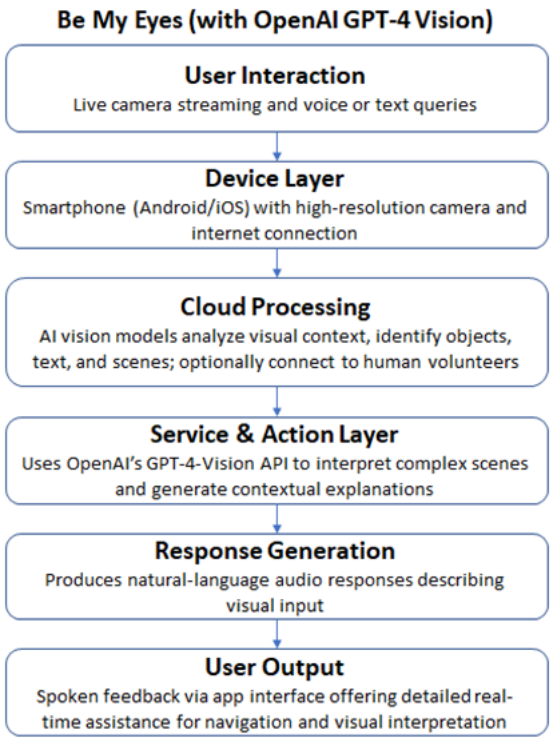
It assists users in perceiving visual information by translating it into spoken narration, including reading text, describing scenes, identifying faces and recognising products.

Usage and licensing:

Free for personal and educational use. Available via the Apple App Store. Internet access is required for cloud-based recognition.

2. Be My Eyes (with OpenAI GPT-4 Vision)

Type:	AI-enhanced visual interpretation and assistance platform.



General Information:

Be My Eyes is an app that connects blind and partially sighted users with AI or human volunteers who provide descriptions of their surroundings via live video streaming. The 'Virtual Volunteer' feature uses GPT-4 Vision to provide real-time, AI-driven assistance.

Support provided:

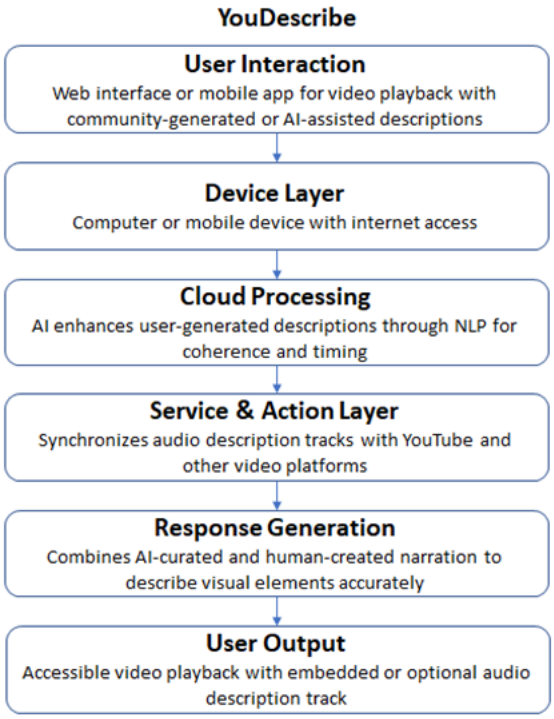
Real-time visual interpretation, object recognition and contextual explanations of images, documents and environments via audio narration.

Usage and licensing:

Free for users. AI-based features are available via the mobile app (Android/iOS). It integrates with OpenAI cloud services.

3. YouDescribe

Type:	Community-based and AI-assisted audio description platform



General Information:

YouDescribe is an online platform that allows users to access YouTube videos with audio descriptions created by volunteers or enhanced using AI-assisted editing tools.

Support provided:

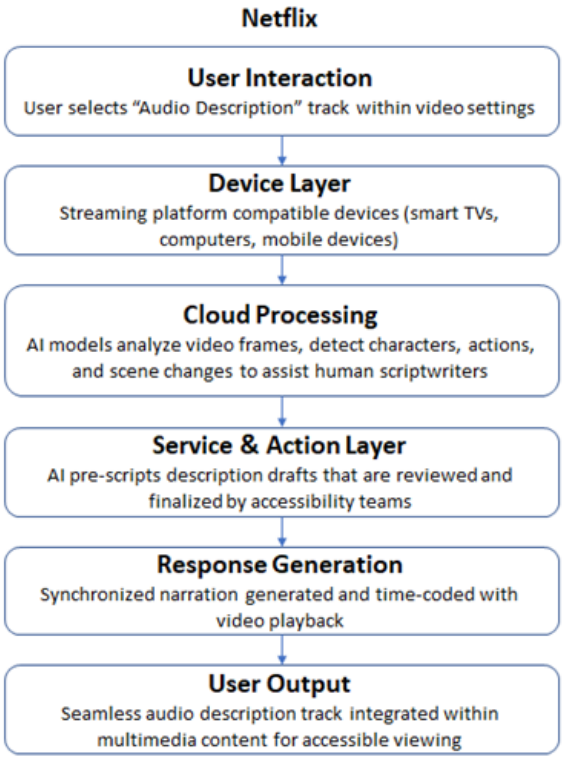
Users can listen to detailed narrations of visual content in educational or entertainment videos, which are synchronised with the playback to make them more accessible.

Usage and licensing:

Free web service for non-commercial use, enabling users to create or access descriptive video tracks.

4. Netflix

Type:	AI-assisted automated media accessibility system.
Website:	https://play.google.com/store/apps/details?id=com.google.android.apps.accessibility.reveal&pli=1



General Information:

Major streaming platforms like Netflix and Amazon Prime Video employ AI-supported tools to generate and optimize audio description scripts, increasing accessibility in entertainment and educational media.

Support provided:

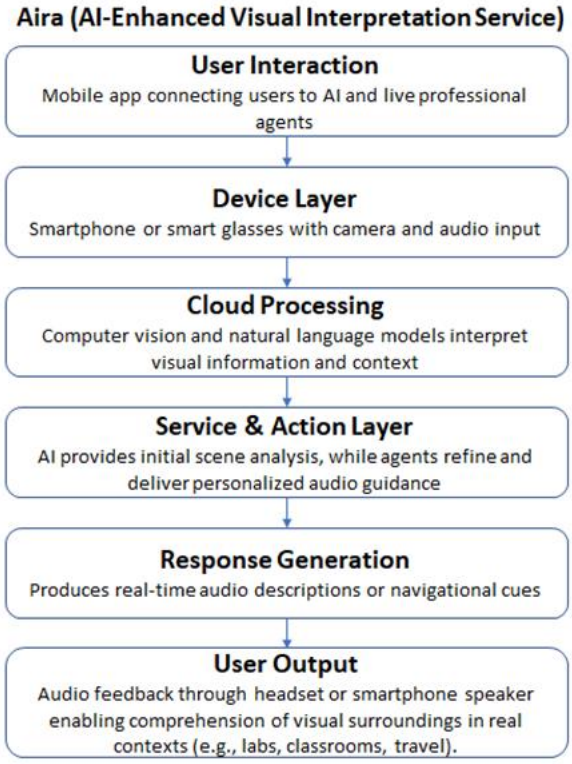
Analyzes video scenes using computer vision and natural language generation to pre-draft descriptive scripts, which are reviewed and finalized by accessibility editors before integration.

Usage and Licensing:

Available as part of platform subscription; users can enable audio description through playback settings.

5. Aira (AI-Enhanced Visual Interpretation Service)

Type:	A Hybrid AI and human-assisted audio interpretation service
Website:	https://aira.io/



General Information:

Aira uses a combination of AI-powered scene analysis and human assistance to provide users with audio interpretation when navigating physical or digital environments.

Support provided:

It enables blind and visually impaired users to receive real-time, detailed descriptions of their surroundings through a smartphone or smart glasses. Ideal for campus navigation, laboratory environments and independent mobility.

Usage and licensing:

Subscription-based model; available for Android and iOS. Free access is offered in designated public areas through 'Aira Access Partners'.

How AI Supports Students

AI-based audio description tools significantly improve accessibility for visually impaired students by converting visual information from videos, images and real-life environments into spoken descriptions. Using deep learning and computer vision, systems such as Microsoft Seeing AI, Be My Eyes, and Aira analyse visual inputs, identify relevant elements (such as people, objects, gestures, or text), and generate coherent audio descriptions in real time.

In an educational context, these tools make visual learning materials, such as lecture slides, lab demonstrations and diagrams, accessible without the need for manual adaptation. For example, YouDescribe enables academic videos to include synchronised narrations, while AI-assisted systems on platforms such as Netflix and Amazon Prime Video enhance multimedia courses with inclusive features.

Integrating such applications into virtual learning environments enables universities to provide students with visual impairments with the means to independently engage with visual resources, participate in group projects, and follow multimedia lectures. These tools reduce reliance on human assistance and foster autonomy and equal participation in academic life.

Teacher's Role and pedagogical models suggested to use

Pedagogues and academic personnel assume a pivotal function in facilitating and coordinating the integration of AI-based audio description instruments into the educational process. They are responsible for ensuring that all visual teaching materials, such as presentations, videos and lab demonstrations, either come with accessible descriptions or are compatible with tools such as Seeing AI or YouDescribe.

Educators are encouraged to prepare content that supports multiple sensory channels, providing visual and auditory access from the outset. Providing audio-described versions of course materials ensures inclusivity, eliminating the need for further adaptation.

Collaboration with accessibility offices is undertaken by teachers to verify the quality of descriptions and collect student feedback on usability.

In the final analysis, teachers' roles revolve around curation and coordination — picking the right AI tools, making sure they're in line with what's taught, and keeping up a learning environment that's open to all students and free of any barriers.

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III. AI Tools Supporting Students with Mental Health Disabilities

Introduction to the Topic III

The challenges facing contemporary higher education largely revolve around the growing number of students with mood disorders (e.g., depression, bipolar disorder), anxiety disorders (e.g., phobias, post-traumatic stress disorder), personality disorders (e.g., borderline, paranoid), or psychotic disorders (e.g., schizophrenia). This situation is driving a growing search for innovative and personalized strategies to support students with mental health disabilities. In this context, AI-based tools are seen as a key element in maintaining and strengthening students' mental well-being.

Technologies such as Intelligent Tutoring Systems (ITS) and Generative AI (GenAI) enable the creation of adaptive learning systems that tailor content, pace, and delivery formats to individual student needs, reducing anxiety and cognitive load, thereby increasing engagement and motivation.

AI is also developing the field of neuro-enhanced learning. Research on brain-computer interfaces (BCIs) indicates potential for developing Non-Academic Skills and Abilities (NaSAs), including emotion regulation, attention and concentration.

SCENARIO 9. Time and task management apps

Introduction to the Scenario

Time and task management are fundamental skills for academic and professional success, especially given the increasing competitive pressures and complexity of modern life, which often translate into student mental health issues such as depression, anxiety, and stress (Hoeflich et al., 2023). Therefore, focusing on psychological education and improving students' mental well-being is crucial. In this context, traditional scheduling applications are evolving, giving way to advanced artificial intelligence (AI)-based tools that offer not only simple organizational functions but also personalized support (Lin et al., 2024; Paglialunga & Melogno, 2025), reducing cognitive load (Benitez Amaya et al., 2024), and increasing autonomy (Esquivel et al., 2024). Research shows that integrating AI tools into educational environments has the potential to promote inclusiveness and accessibility of learning for a diverse group of students (Lin et al., 2024; Melo-López et al., 2025).

The aim of the Scenario

The main goal of this scenario is to increase the knowledge and competencies of academic teachers, administrative staff, and students with mental health disabilities in using time and task management applications in educational practice. These skills will be a crucial element influencing the quality of teaching and learning for students with mental health disabilities.

Description of AI tools

1. Time Harmony

Website:	https://timeharmony.pl/en/
Author:	Teddy Pena

A tool for balanced and motivating time management. Time Harmony, powered by ChatGPT, acts as an assistant that provides practical advice and motivation to help users improve not only their productivity but also their well-being. The goal of this tool is to provide users with tools and tips to make their day more productive and positive. Its core features include helping them better organize their day, offering motivational tips, helping them set realistic weekly goals,

and providing inspiration for a great start to the day. Time Harmony's mission is to restore work-life balance by providing practical and inspiring time management advice.

Time Harmony can be particularly useful for those with workaholic tendencies and those who tend to over-focus on a specific task or topic.

2. Daily Spiral

Website:	https://dailyspiral.app/
Author:	Steve

Daily Spiral is a minimalist, aesthetically pleasing app that helps you organize your thoughts and develop a routine in a subtle, unobtrusive way (without the pressure of having to be productive all the time). Setting a reminder and answering just one question allows you to calm down, while also jotting down thoughts and collecting inspiring questions or phrases from classes, lectures, or presentations for reflection. Daily Spiral is a journaling app that doesn't collect data or have growth indicators to track.

Keeping a Daily Spiral journal can help you manage your emotions, track patterns, and create a space for self-reflection.

3. OneTask

Website:	https://pl.onetask.me/
Author:	Martin Adams

An AI task app that prioritizes tasks for creative people.

OneTask is an AI-powered task management and productivity app.

The app focuses on automatically prioritizing tasks based on their importance and deadlines, as well as the user's personal preferences. It offers a simplified, intuitive interface that helps reduce clutter and focus on the tasks at hand. OneTask also offers features such as Google Calendar integration, which allows the AI system to assist with task planning, and a suite of features that simplify project planning by guiding you through the necessary steps to completion, reducing complexity.

The tool is designed specifically for creative people, those with ADHD, and neuroatypical individuals.

4. Todof - AI Reminder

Website:	https://todof.art/
Author:	Sasha Yak

A tool for effectively reminding you of important events and tasks. Reminders and prompts are personalized and "intelligently" learn the user's behavior to be as effective as possible and increase engagement. Todof features automatic icons: intuitive and recognizable symbols that turn your to-do list into a visual powerhouse, making them easier to notice and harder to ignore. Progressive sounds are used, which intensify when the user tries to postpone an important task – cutting through other sounds, helping maintain focus and attention on what has been planned. Based on the principle of sensory gating from cognitive psychology, Todof understands that the brain of someone with ADHD, for example, can ignore repetitive, boring alerts, so it switches things up, keeping the senses alert and tasks in focus.

This app is for people who need strong stimuli, easily get bored, and have difficulty staying focused on urgent and important tasks, with a tendency to procrastinate.

5. OnLife

Website:	https://on.life/https://on.life/blog/the-pomodoro-technique-and-ai-collaboration

OnLife combines the popular Pomodoro technique with artificial intelligence tools, creating an innovative solution that significantly increases productivity through personalization and customization. Characterized by focused 25-minute work intervals followed by short breaks, this method can be further optimized. The Pomodoro technique is a time management method that has gained popularity for its ability to increase concentration and productivity and promote deep focus on tasks during work breaks, while also providing short moments of rest, preventing burnout, fatigue, and boredom. OnLife provides customizable study and break sessions, adapting them to preferences and energy levels. Task prioritization is supported by artificial intelligence, ensuring that work sessions (studying, assignments, and learning) are dedicated to

the most important tasks. OnLife can analyze your to-do list, consider deadlines, and even historical productivity data to recommend the optimal task and time for its completion during the next session. This intelligent app can recommend relaxation exercises during breaks, making your free time more restorative and productive. Based on the Pomodoro technique, the app helps you stay active and take breaks. It may be particularly useful for people who have difficulty maintaining attention and concentration or who get bored easily, but also for people with a tendency to be workaholics.

Thanks to personalization, it can also be useful for people on the spectrum who need an individual approach to completing tasks and taking breaks.

How Artificial Intelligence supports students

In times of information overload and fatigue from excessive educational content, AI applications can help organize thoughts through journaling [DailySpiral]. Journaling can be a tool for supporting mental health and promoting personal growth. Participants in studies have reported it as an effective tool in a variety of settings, including academic settings, personal use, and therapy. The fact that journaling can be tailored to individual needs and goals makes it particularly effective (Koziol, 2021).

In a world full of stimuli and distractions, time and task management apps support people who struggle to concentrate and prioritize tasks [OnLife, OneTask], as well as those who forget to rest [OnLife]. It has been discovered that a lack of time management skills and poor mental health share common characteristics. The ability to plan and manage your day well has a positive impact on your mind, as does doing things that make you happy. Simple yet effective time and task management skills allow you to spend your time productively and positively, which translates into stress reduction (Fredrick, 2022). AI tools can also support mental well-being by implementing the concept of learning-life balance [TimeHarmony]. Taking care of your free time, understood as a period that people can freely use to relax, have fun, and pursue their passions, seems to be important in maintaining physical and mental health. Managing work and leisure time can improve mood and alleviate depression, which are also experienced by students (El Hadad et al., 2024).

There are also tools for people who ignore standard reminders and need firm reminders (Todof). Mobile apps have recently become useful tools for people with attention deficit hyperactivity disorder (ADHD), offering a range of features and capabilities to manage unwanted symptoms, increase productivity, and improve organization. Research suggests that specialized apps can help people with ADHD by improving task and time management, enhancing focus, cognitive training, self-control, and mindfulness. However, the effectiveness of some features may vary, and further research is needed to determine their long-term usefulness. When selecting and incorporating apps into learning strategies, individual needs, preferences, and features should be considered. Collaboration with experts or specialists in further research is recommended to ensure that mobile apps can truly help people with ADHD, improve self-management, and improve their overall well-being (Kyriakaki and Driga, 2023). The potential of smartwatches as intelligent wearable devices was also explored, testing how smartwatches could be adapted to provide support and how these devices could integrate strategies used by people with ADHD to cope with daily challenges. It was found that these devices could be customized with features such as customizable notifications, alarms, timers, and reminders that aligned with individual routines. The importance of educational support was emphasized, along with the need for further research and integration of these tools into healthcare systems or educational institutions to provide additional support for people with ADHD in their daily lives (Salomonsson Stridsberg, 2024).

The teacher's role and suggested pedagogical models

Modern higher education, striving for inclusiveness, faces growing challenges related to student mental health. Issues such as depression, anxiety, and chronic stress are common, and students with mental health conditions experience difficulties with concentration, memory, slowed reaction times, and task organization. In this context, artificial intelligence-based applications that support time and task management (assistive technologies (ATs) play a crucial role in promoting independence and full participation in the learning process. However, the key to successfully implementing these tools lies in adopting appropriate pedagogical models and properly preparing academic staff.

For the use of time and task management applications to be effective, they should be embedded in specific educational models, which undoubtedly include:

1. Self-Regulated Learning (SRL) and Self-Determination Theory (SDT): AI in task management fits perfectly into the SRL framework, which encompasses the phases of planning, engagement, and self-assessment. AI applications support the planning phase through reminders and teamwork organization (Esquivel et al., 2024). According to SDT, AI supports students' autonomy and competence, which directly translates into improved motivation, engagement, and well-being (Melo-López et al., 2025). Acting as an assistant, AI allows students to independently determine their learning process and pace, which is particularly important in cases of mental health disorders, where a sense of control can be diminished (Hao et al., 2025).
2. Cognitive Load Theory (CLT): In the context of mental disorders, where concentration and memory problems often occur, reducing cognitive load is crucial. AI is an ideal tool for managing cognitive load (Esquivel et al., 2024), offering personalized learning resources that allow students to focus on key tasks. Acting as a personalized learning assistant, AI can automate some complex intellectual tasks or simplify complex content, thereby reducing the load (Lin et al., 2024).
3. AI Adaptive and Inclusive Learning Model (AIAL Theory): This model emphasizes the adaptability, inclusiveness, and responsiveness of AI tools. Students with mental health conditions require flexibility in their learning, which AI can provide by adapting the pace and difficulty of the material (Lin et al., 2024). In practice, this means using apps that not only help with organization but also support concentration (e.g., AI Focus Apps/Brain.fm) and provide personalized feedback. However, teachers must monitor whether AI tools actually improve student well-being.

AI applications that support time and task management offer real support for students with mental health issues, including helping them cope with anxiety and the need for routine. The teacher's role in this process is crucial, as they must not only implement flexible teaching methods but also adopt a pedagogical framework that allows for personalized support and reduces students' cognitive burden. Effective support for students with mental health issues requires academic staff to be adequately prepared and aware of the ethical challenges involved.

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SCENARIO 10. Platforms with Adaptive Learning Features

Introduction to the Scenario

Students with mental health disabilities often experience anxiety, stress, difficulty concentrating, memory, slow reaction time, and difficulty organizing tasks in educational settings. Traditional forms of education often prove insufficient because they lack personalization and the ability to respond in real time to students' dynamically changing mental states (Hao et al., 2025). In response to these challenges, platforms utilizing adaptive learning systems (ADAS), based on AI and intelligent tutoring systems (ITS), provide innovative support. AI offers the ability to deliver personalized and tailored learning strategies, which is fundamental to the process of inclusivity. These platforms can dynamically modify educational content, the pace of learning, and the format of delivery based on individual student needs, which is particularly valuable for individuals with mental health disorders (Paglialunga & Melogno, 2025).

The aim of the Scenario

The main goal of this scenario is to improve the knowledge and competencies of academic teachers, administrative staff, and students with mental health disabilities in using platforms with adaptive learning features in educational practice. These skills will be a crucial element in reducing the cognitive and emotional overload of students with mental health disabilities.

Description of AI tools

1. BrainRush AI

Website:	https://www.brainrush.ai/en
Author:	Laisa Drake

BrainRush is an educational tutoring tool designed to personalize and transform the learning experience. Integrating artificial intelligence technologies, it adapts to individual learning styles, striving to make education more effective and engaging, but above all, tailored to the learner's current capabilities. A key feature of BrainRush is providing 24/7 support for students, so it can be accessed at any time, depending on the user's convenience.

Fundamentally, BrainRush serves as a reliable, accessible, and personalized digital tutoring partner for both students and parents (who can verify and identify key challenges) with the goal of transforming traditional learning methods into a more adaptive, intelligent, and user-centric model.

2. Packback

Website:	https://packback.co/

It's a platform designed to facilitate inquiry-based discussion, writing assignments, and instructor coaching. The platform offers various AI-powered features, specifically Packback Questions for student discussions and Packback Deep Dives, which provides feedback on written texts. The text isn't generated by AI; rather, the author's text is subjected to discussion by AI. Packback Questions aims to spark curiosity, build community, increase motivation, and support writing practice through AI coaching to help students improve their questioning and response skills. Packback Deep Dives, on the other hand, aims to increase students' writing skills and confidence in writing assignments by providing immediate AI-powered coaching. One of Packback's distinctive features is its instructional AI, which enhances critical thinking and writing skills by providing immediate feedback, while also allowing teachers to focus on improving students' ideas. AI doesn't write for students; it educates them to become stronger writers and critical thinkers. Packback's instructional AI also acts as a grading assistant, handling certain aspects of assignment management and grading, thus providing more time for teachers to focus on their students' content and offer meaningful, personalized feedback.

3. AI Albert

Website:	https://chatgpt.com/g/g-8sSRMRVPZ-ai-albert
Author:	fourthmind.ai

The educational companion, based on ChatGPT, aims to support learning with a sense of humor and the guise of a digital persona of Albert Einstein. This persona characteristic makes AI Albert engaging, which can enhance the learning experience for users. Harnessing the power of ChatGPT, AI Albert offers various features focused on educational support. It can create courses

based on user requests, demonstrating the ability to dynamically and personalizedly generate educational content. AI Albert is also capable of creating on-demand graphics, which can be a beneficial tool for visual learners or those who want to create educational materials. Another key feature of the tool is its ability to interpret information in real time. This allows users to gain insights or explanations about live developments or data in an easily digestible manner. Additionally, AI Albert offers document feedback functionality. Users can upload their documents to receive feedback, enhancing its usefulness as an educational tool. These features work together to create a comprehensive virtual learning companion. Users interested in this GPT must register for ChatGPT Plus.

4. Cogent

Website:	https://joincogent.com/

It's an intelligent learning platform designed to increase efficiency and routine. It offers a range of interactive tools, such as quizzes, flashcards, and the creation of study plans, to enhance learning. Furthermore, the platform features an innovative File Chat feature that utilizes intelligent chatbots for instant assistance, answering user questions, and offering a personalized learning experience. Cogent offers interactive quizzes that adapt to your learning pace, along with the encouragement of collaborative learning by sharing study files with other learners. It streamlines the learning process with an organized dashboard where all study tools are available in one place. A key advantage of the platform is its ability to customize the learning experience to suit your individual style and pace. It also offers flexible pricing plans to suit different needs.

5. VoiceBrief

Website:	https://voicebrief.io/

This unique learning tool aims to enhance traditional learning practices, primarily by transforming text-based content into audio lessons.

This tool is highly beneficial for students who prefer auditory learning. VoiceBrief's primary function is to convert PDF files and personal notes into audio format (either as a primary

preferred format or as a secondary format for review). VoiceBrief can create summaries and quizzes from a given text. This allows students to actively study and review materials while engaging in other activities, such as commuting, working out at the gym, or multitasking. VoiceBrief not only aims to make learning more accessible for students but also to create a dynamic learning environment that accommodates their learning styles and daily schedules.

How Artificial Intelligence supports students

Adaptive learners can benefit from personalized, 24/7 educational tutoring (BrainRush AI) or an educational companion with a digital Albert Einstein persona, which will combine learning with entertainment (AI Albert). While science and specific academic disciplines can be anxiety-inducing, 24/7 support from an AI assistant can address this anxiety. One study used math anxiety as a moderating variable to determine how AI-based tutoring systems affected university students' ability to solve math problems. It was found that such tutoring systems had a direct and significant impact on students' ability to solve math problems (Asiedu Menlah & Boateng, 2025).

To develop writing and critical thinking skills, applications that offer inquiry-based discussion, feedback on text, and instructor coaching (Packback) can be used. The use of AI can significantly enhance students' critical thinking skills. Interviews were conducted with students who frequently use AI. Respondents indicated that AI helps them expand their ideas and provide deeper insights, but its effectiveness depends on users' ability to ask precise questions and critically interpret AI-generated content. The findings highlight that although AI can significantly aid in developing critical thinking skills through personalized learning experiences and interactive simulations, challenges remain, such as potential biases (Lawasi et al., 2024). The role of AI in critical thinking remains understudied. Initial results indicate a significant negative correlation between frequent use of AI tools and critical thinking abilities, mediated by increased cognitive load. Younger participants in the 2025 study, in particular, demonstrate greater reliance on AI tools and lower critical thinking scores compared to older participants. These results highlight the potential cognitive costs of AI tool dependence, emphasizing the need for educational strategies that promote critical engagement with AI technologies (Gerlich, 2025).

Adaptive learning requires developing a routine and creating a positive experience (Contrino et al., 2024), which can be facilitated by interactive and personalized tools, such as quizzes or flashcards that adapt the delivered material to the learning pace, along with encouraging collaborative learning by sharing study files with other learners [Cogent]. In times of ubiquitous multitasking, those who prefer listening will appreciate using tools that incorporate inspiring media (Hou, 2025) and convert text to audio, such as converting PDF files and personal notes to audio – which may be the primary preferred form or a supplementary form for revision [VoiceBrief].

The teacher's role and suggested pedagogical models

Platforms with adaptive learning capabilities tailor content, pace, and workflow to individual needs, which can significantly support students with mental health conditions. The teacher's role in this learning process shifts from that of a "knowledge provider" to that of a facilitator who can interpret students' results (numbers, graphs) in the context of their individual challenges (Chen et al., 2021). In this context, several key teacher responsibilities should be noted:

1. Identification and initial diagnosis of needs: the teacher should understand what symptoms or limitations affect learning (e.g. difficulty concentrating, mood swings, anxiety) and implement appropriate platform settings and compensatory strategies;
2. Data monitoring and interpretation: algorithmic reports (e.g., on progress, time spent on tasks, error patterns) require pedagogical interpretation to distinguish content difficulties from mental health problems;
3. Academic and emotional interventions: Teachers should combine content modifications (e.g., breaking down tasks into smaller steps) with emotional support techniques (e.g., short breaks, flexible deadlines), and refer students to specialists when significant student challenges are identified. Research suggests that adaptive programs, combined with competent instructor/mentor supervision and appropriate emotional support, can improve both academic outcomes and student well-being (Chen et al., 2021).

In the context of pedagogical models, it is worth considering the integration of three complementary approaches:

1. Universal Design for Learning (UDL) – creating materials and learning paths with multiple possibilities for presenting knowledge, so that the adaptive platform is one of the channels, not the only way to access content;
2. Self-Regulated Learning (SRL) – teaching self-regulation strategies (planning, monitoring, adapting) and building features that support SRL into the platform (e.g. metacognitive prompts, reminders);
3. Response to Intervention (RtI) – a multi-tiered support system where the platform provides support at a general level and the teacher and specialists respond in response to lack of progress (Veytia Bucheli et al., 2024).

When integrating adaptive platforms into the educational process, it is essential to consider the following phases:

- the preparatory phase – training teachers in using the platform, interpreting data, and the basics of psychoeducation (to reduce "technostress" and technology-related anxieties);
- the diagnostic phase – verifying the student's profile (cognitive and emotional functioning) and configuring adaptive parameters;
- the implementation phase – ongoing monitoring, short feedback sessions with students, and didactic adjustments;
- the evaluation phase – assessing educational and health outcomes and revising adaptation models (Fernández-Batanero et al., 2021; Delello et al., 2025).

It's worth emphasizing that without proper preparation and systemic support, implementing AI-based technologies can increase teachers' workload and negatively impact their mental health, indirectly limiting benefits for students. Therefore, the implementation of such tools should include time for training, technical support, and interdisciplinary collaboration (Fernández-Batanero et al., 2021).

When implementing adaptive platforms into the educational process, it's also important to:

- combine algorithmic adaptation (the platform itself adapts the material to the student's abilities, i.e., provides easier or more difficult tasks, varies the pace, shows varied examples, etc.) with metacognitive instruction that helps students analyze their own

progress (e.g., "Think about why this answer was incorrect," "What will help you remember this information?") and support from the teacher, who can recognize student emotions and increase their engagement and motivation;

- apply the principles of Universal Design for Learning (UDL), which refer to making learning accessible and comfortable for everyone, regardless of learning style, pace, or limitations (e.g., mental or cognitive). To achieve this, it is important to use a variety of presentation formats (e.g., text, audio, video, graphics, or interactive quizzes), a variety of tasks (students can choose how to demonstrate understanding, e.g., write an essay, record a video presentation, create a poster, or take a test), and flexible deadlines (e.g., extend the deadline or divide the work into smaller sections);
- incorporate periodic, face-to-face meetings (online or face-to-face);
- monitor cognitive and emotional load (e.g., use short mood or motivation surveys);
- participate in training on data ethics, privacy, and the interpretation of algorithmic results (Delello et al., 2025; Fernández-Batanero et al., 2021; Veytia Bucheli et al., 2024).

To sum up, it should be emphasized that adaptive platforms have real potential to support students with mental disorders, but their educational effectiveness depends largely on the active and competent role of the teacher.

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SCENARIO 11. Automatic note-taking tools

Introduction to the Scenario

Given the specific learning challenges faced by students with mental health conditions (e.g., difficulty concentrating, memory problems, slow reaction time), traditional manual note-taking methods are becoming increasingly challenging. AI-based tools offering automatic transcription and summarization functions are becoming key assistive technologies that positively impact well-being and increase student independence and engagement (Elrefaei et al., 2025; Esquivel et al., 2024). Automated note-taking tools (e.g., ChatGPT, Claude AI) act as personalized assistants, helping to transcribe lecture recordings, isolate key points, and generate notes. These features are extremely valuable for students with mental health conditions, allowing them to more easily absorb content without the constant burden of simultaneously listening, processing, and physically recording information.

The aim of the Scenario

The main goal of this scenario is to improve the knowledge and competencies of academic teachers, administrative staff, and students with mental disabilities in using AI tools for automatic note generation in educational practice. The ability to use such tools and applications will undoubtedly contribute to reducing the cognitive and emotional overload of students with mental disabilities.

Description of AI tools

1. Unote

Website:	https://unote.ai/
Author:	Vladimir Kalynyak

A voice note-taking app designed to simplify the process of recording and organizing your thoughts. It leverages cutting-edge artificial intelligence technologies to capture, transcribe, and categorize ideas. The app offers instant voice recording, powered by advanced OpenAI speech recognition technology, providing accurate transcription in multiple languages and accents. Intelligent categorization, powered by ChatGPT, automatically organizes notes into

relevant categories and tags for easy retrieval. The intuitive and minimalist interface promotes a distraction-free environment, while a secure sync feature ensures your notes are accessible across all your Apple devices.

Unote provides cloud computing for voice recordings using the OpenAI API, ensuring security and comprehensive functionality. Unote users include professionals who want to document meeting insights, students who record lecture notes, creative, neurotypical, and aneurotypical minds who try not to lose a single moment of inspiration or thought, and anyone who prefers speaking to writing.

2. Notes Ninja

Website:	https://ninjanotes.live/
Author:	Jayaditya Peddisetti

Notes Ninja is a tool that helps summarize transcripts and notes. It's designed to highlight key points, making it useful for exam study and note-taking. Powered by ChatGPT, it's useful for students or professionals who want to organize large amounts of information into condensed blocks for easier digestion. The tool offers quick starters like "Summarize these notes for exam preparation:" and "List the key points from this?" to guide users.

With Notes Ninja, users have the ability to convert large textual materials into the main points that matter. This core feature of Notes Ninja brings a level of convenience and efficiency to the overall process of studying or taking notes, ensuring optimized learning and comprehension.

3. Mind Map Wizard

Website:	https://mindmapwizard.com/
Author:	Linus

Mind Map Wizard is an AI-generated mind mapping tool that provides a comprehensive overview of a topic. Among its key advantages for people with psychological challenges are its simplicity, reduced redundancy, and the ability to use it without creating an account. The mind mapping process involves entering a topic of interest, and the app uses AI to explore the topic and generate a comprehensive, visually engaging mind map. This tool aims to streamline the

mind mapping process by encouraging the exploration of ideas in a structured, visual format. It is particularly useful for goal setting, planning, and brainstorming new ideas. It helps organize directions for further exploration.

Mind Map Wizard also supports entering large amounts of text, such as notes, which it then organizes into a mind map format. Although designed with user-friendliness in mind, the tool also offers options for more advanced users, including the ability to edit, share, and export created mind maps in various formats for use on other platforms. There are no usage limits or the need to create an account, making it accessible to all users.

4. HLAI

Google Chrome plugin:	https://chromewebstore.google.com/detail/hlai/dkppddahgjflcipegjnjbladmgmimkpa

A tool that serves as a Google Chrome extension and provides instant explanations for any text, requiring users to simply highlight the text that requires explanation. Using a keyboard shortcut, such as CTRL or CMD, allows for quick accessibility. HLAI is an innovative and efficient way to navigate text content, eliminating the need to manually search for unfamiliar terms or phrases. A key feature is the ability to save answers for future reference, ensuring users can revisit explanations when needed.

Useful for complex content, this tool facilitates memorization of unfamiliar phrases and helps maintain focus on the main topic without the distraction of searching for explanations on your own.

5. AI Flash.Cards

Website:	https://aiflash.cards/?ref=producthunt
Author:	Mahmoud Masri

This advanced tool is designed to streamline learning processes by transforming any text or PDF file into personalized flashcards. The platform relies on artificial intelligence to intelligently generate flashcards and can be used in several ways: by entering specific topics into the system; by pasting paragraphs of text or links to web content. The AI Flashcards Generator can extract critical information from long PDF documents, transforming them into manageable and easy-

to-view flashcards. Recognizing the importance of multilingualism in global learning, it also supports the creation of flashcards in 100 different languages. The service integrates a Spaced Repetition feature, which schedules flashcard reviews at intervals optimal for sustained and efficient study, and also allows for printing flashcards. Users can organize their flashcards into custom sets for easy tracking and study, and these sets can also be shared with other users in the community, encouraging collaboration within the learning environment.

How Artificial Intelligence supports students

Automatic note-taking from numerous and lengthy lectures and classes can be an extremely useful tool for those with attention deficits [Unote]. Learners are faced with large amounts of information that must be processed, stored, and utilized in the educational process. Taking lecture notes remains a significant task that requires significant time and effort. Therefore, automating this process with speech recognition and artificial intelligence technology opens up new possibilities: effective learning, time savings, improved note quality and accuracy, and accessibility for all participants in the educational process (Sulima and Genash, 2024). Students are increasingly adopting a digital approach to note-taking during lectures, driven by technological advancements and environmental sustainability. Digital notes are perceived as having advantages in terms of storage, organization, and sharing. Other benefits include the ability to search notes and the ability to use digital devices to find additional information within a lecture (Arden et al., 2024), although access to email and social media is often cited as a potential distraction (Flanigan et al., 2023). Collected notes require summarization and highlighting key points to make them more digestible [Notes Ninja], as well as mind mapping for those who need to visualize and organize their ideas in a map [Mind Map Wizard]. Computer-designed mind maps have been criticized as slower and more distracting than hand-drawn ones (Hosking, 2007), yet appreciated as a good technique for supporting writing and organizing ideas in the initial phase (Miftah, 2011).

Using and sharing flashcards with others serves a partially entertaining purpose, helping to maintain attention, combat boredom, and foster interpersonal relationships [AI Flash.Cards]. Research suggests that digital flashcards are a good tool for supporting learning in terms of memorization and fact-finding. Their use is suggested early in the learning process (Maharani and Hadikusuma Ramadan, 2023). In academic settings, learned nomenclature is also used in

both spoken and written language, and given the wide range of digital technologies available to higher education students for language and vocabulary learning, it is necessary to assess the relative effectiveness of these technologies in supporting academic learning (Zarrati et al., 2024; Sage et al., 2022). The potential of combining education with entertainment (edutainment) is still being explored, especially in times of dominance of digital distractions (social media, entertainment media, mobile games), the education sector faces significant challenges in maintaining student engagement and improving learning outcomes (Kachhwaha et al., 2025).

As part of learning, when complex content arises, tools for explaining and facilitating the memorization of phrases, entries, and concepts can help maintain attention on the main topic, without getting distracted while searching for explanations on your own [HLAI].

The teacher's role and suggested pedagogical models

The use of automated notetaking tools is important for reducing cognitive load. Students with mental health issues often experience increased emotional stress, stemming from their impairments. AI can help manage this load by offering personalized resources and translating complex academic content (Elrefaei et al., 2025). Automated notetaking allows cognitive energy to be redirected from mechanical recording to better understanding the content of the teaching material. This type of cognitive support is crucial for increasing learning efficiency and minimizing stress (Elrefaei et al., 2025; Khalaj et al., 2024).

In order for automatic note-taking tools not to become a substitute, but a complementary support (complementary AI model), their use must be embedded in specific pedagogical models, which undoubtedly include:

- Cognitive Load Theory (CLT): The primary goal is to minimize extraneous cognitive load. When suggesting the use of automated notetaking tools, the teacher adopts an approach in which AI takes over transcription and organizational tasks, freeing the student to focus on better processing and learning.
- Self-Determination Theory (SDT) and Self-Regulated Learning (SRL): The use of AI supports fundamental psychological needs such as autonomy and self-fulfillment, which leads to improved motivation and well-being (Hao et al., 2025; Elrefaei et al., 2025). SRL

is supported when AI helps students with planning (organizing notes) and engagement (easier learning of difficult content).

- Adaptive and Inclusive Learning (AIAL) Theory: This model is proposed as a framework for ethical AI implementation, emphasizing that technology should be adaptive, inclusive, and responsive (Lin & Chang, 2024; Lin et al., 2024). Automated notetaking implements these principles by adapting the format and language of materials to individual student needs.

The teacher's role in an educational environment supported by assistive technology is multifaceted. For students with mental health issues, the teacher should act as a technology support coordinator, helping the student select the appropriate tool, learn how to use it, and understand its limitations. At the same time, research shows that simply providing assistive technology is not enough. The teacher's attitude as a role model for its use is crucial (Nazaretsky & Maia, 2022).

Ensuring students' emotional safety and inclusion is also crucial. Automatic note-taking can facilitate information processing, but it can also lead to a sense of isolation or passivity if students treat the tool as a substitute for their own activity (Delello & Wilkie, 2025). Therefore, teachers should regularly monitor how technology affects students' well-being and engagement, especially those with depressive or anxiety disorders, which may increase the risk of withdrawal from educational interactions.

To effectively implement automatic note-taking tools and applications into the learning process, the following pedagogical models and strategies should be addressed:

- The scaffolding (support) model with assistive technology involves the gradual introduction of technology and tailoring the level of support to the student's individual needs. Initially, the teacher helps the student analyze generated notes, discusses errors, and teaches how to fill gaps in the content. Over time, this support is reduced, and the student becomes increasingly independent (Jukiewicz, 2025). This model is particularly important when working with individuals with mental disorders, who often experience difficulties with concentration, working memory, and organizing material. Gradual

development of tool skills fosters a sense of competence and control, which positively impacts intrinsic motivation.

- The Inclusive Digital Education model assumes that educational technologies must be accessible and adapted to the diverse needs of users, including students with mental health issues. OECD (2023) emphasizes that learning technologies should not only facilitate knowledge acquisition but also foster a sense of belonging and mental well-being. In practice, this means that teachers carefully select tools (e.g., an application that allows for lecture transcription, summarization, and content summarization) and incorporate them into group and reflective work to avoid the risk of digital isolation.
- The metacognitive and technological reflection model argues that automatic note-taking tools are the starting point for developing metacognitive skills. Students learn to analyze their own cognitive processes, plan their learning, and regulate them based on the notes they generate. Teachers, on the other hand, should encourage students to review the generated notes, identify gaps, formulate questions, and compare the content with their own observations. Research on AI-assisted learning indicates that the mere use of technology does not lead to improved results. Promoting reflective use of tools is crucial (Więckiewicz-Modrzewska, 2024; Jukiewicz, 2025). In students with mental health disorders, this model helps reduce automatic learning and counteract passive content consumption.

When implementing automated note-taking tools, ethical and emotional issues should also be considered. Automatically recording content can raise anxiety or a sense of loss of privacy, so it is essential to ensure full voluntary use and clear rules of use (Costardi et al., 2023). Teachers should also monitor the technology's impact on social relationships, as excessive reliance on AI can reduce the frequency of interpersonal contact, which is particularly dangerous for students who tend to isolate themselves (Delello & Wilkie, 2025).

In summary, automatic note-taking tools have the potential to support the learning process of students with mental health issues by reducing cognitive load and increasing accessibility to learning material. However, success depends on the active role of the teacher, who can select appropriate tools to support students with special educational needs.

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SCENARIO 12. Applications supporting everyday activities

Introduction to the Scenario

Students with mental health disorders experience numerous difficulties in their daily academic lives, which impact their cognitive, emotional, and social functioning. In academics, they often experience problems with concentration, memory, and organization, which makes it difficult to effectively learn material and complete tasks in a timely manner (Jukiewicz, 2025). Symptoms of mental health disorders, such as depression or anxiety disorders, can lead to decreased motivation, difficulty with punctuality, and irregular class attendance. Organizational difficulties related to maintaining a daily routine, meeting deadlines, and meeting basic life needs are also common, especially during periods of symptom flare.

Modern technologies increasingly offer applications that effectively support the organization of everyday academic life, in addition to learning tools (e.g., planners, reminders, time management, mental health, and communication apps). For students with mental health issues, such solutions can provide significant support in self-regulation, motivation, and maintaining a daily rhythm. However, the effectiveness of these technologies depends largely on the conscious and empathetic role of the teacher, who helps students incorporate these tools into the learning process in a balanced and safe manner.

The aim of the Scenario

The main goal of this scenario is to improve the knowledge and competencies of academic teachers, administrative staff, and students with mental disabilities in using applications that support the organization and completion of basic tasks in their daily and academic lives. The ability to use such tools and applications will undoubtedly provide significant support in self-regulation, motivation, meeting deadlines, and meeting academic commitments. It will also contribute to reducing anxiety and emotional stress among students with mental disabilities.

Description of AI tools

1. Proofcheck

Website:	https://www.proofcheck.io/

This online AI tool offers advanced proofreading capabilities to avoid errors and ensure polished, professional content. This platform stands out for its ability to proofread content such as books, magazines, reports, and presentations. It is equipped with an AI-based algorithm that can quickly identify textual and visual inconsistencies. Proofcheck is also designed to work in a multilingual environment, allowing it to detect typos and errors across languages, including analyzing language-specific words.

Additional features include recognizing inconsistent margins, detecting widows and orphans on pages, splitting words according to style rules, validating links, and checking images and illustrations for size, scale, and resolution. Proofcheck is a time-efficient solution, capable of handling large volumes of content in seconds.

2. Clarify AI

Website:	https://www.clarify-ai.com/

Designed to help users transform vague ideas into structured insights in minutes, Clarify AI aims to help those facing challenges express their thoughts. The tool works in the following steps: first, the user begins with a vague idea, their first thought; second, Clarify AI refines and articulates it to provide a shared vision of the problem; third, the user is provided with a structured idea (e.g., an organized problem tree or a set of questions and examples) allowing them to focus on refining and crystallizing the problem; then the user adds their own input, and Clarify AI generates context that is specific and relevant to the problem at hand; and finally, the final result is a refined and well-considered idea. Benefits of using Clarify AI include the ability to achieve clarity in minutes, effortlessly structure ideas, and provide a solid foundation for further research and reflection. Clarify AI aims to help users refine their ideas and effectively generate useful insights and context.

3. RewiredMind

Website:	https://www.therewiredmind.com/

This app is designed to help manage stress by providing techniques and strategies tailored to the individual user. The app effectively maps users' stressful situations and educates them by providing appropriate stress relief tools and solution-based coaching strategies. These

strategies and tools incorporate scientifically proven stress management methods, including mindfulness exercises, journaling, affirmations, and cognitive behavioral therapy tools. The AI Coach first seeks to understand the user's stress factors and then proposes a personalized stress management plan. The app can be used to identify stressors, particularly problems arising at work, at school, or in personal relationships. However, for more severe stressful situations, such as traumatic events, professional help is recommended.

RewiredMind offers a free trial that allows you to explore the app's basic features before determining which subscription is right for you.

4. Decision

Website:	https://www.decision.so/
Author:	Maciej Dzialoszynski

This tool was created to simplify and streamline the decision-making process. The AI-powered assistant assists users by providing logical suggestions and diverse perspectives. It can assist with brainstorming options and provide immediate access to key facts related to previous decisions. The assistant also leverages past experience to predict the optimal decision. It can be used for individual and collective decision-making. It also supports asynchronous decision-making, giving team members space for individual reflection. The platform aggregates information by archiving previous decisions, ensuring it is always available. The tool aims to save time and reduce stress for both teams and individuals by providing past data and supporting the information and decision-making process.

This tool is particularly useful for those who struggle with decision-making or need to verify past data.

5. Mood to Color GPT

Website:	https://chatgpt.com/g/g-2qWacruxN-mood-to-color-gpt

This application, powered by ChatGPT, is designed to interpret and translate various moods into the appropriate CSS color code while simultaneously generating color images. The process begins when the user describes their mood, and in response, GPT provides a CSS color code and an aesthetic image that visually expresses the described mood. The range of moods that

can be precisely matched to the appropriate color code ranges from optimism and utter amazement to feelings of worry or calm.

For people with emotion dysregulation, borderline personality disorder, or ADHD, describing their current mood or emotional state can help them regain balance, and the color or visualization provided in response can provide feedback and promote calm. Conversing with ChatGPT about one's emotional states can be risky and does not replace a conversation with a specialist or friend. However, the proposed format does not attempt to replace them and can support creative work and personal expression.

How Artificial Intelligence supports students

Writing term papers, essays, dissertations, or theses can require proofreading, which can be particularly challenging for those who struggle to concentrate or are blind to linguistic errors (Proofcheck). Such tools help students in their written work and initial research papers improve the quality of their work through precise linguistic corrections and advanced text analysis, thus increasing the effectiveness of scholarly communication. Furthermore, these tools save researchers time and effort, allowing them to focus on the research content (Alalaq, 2025).

Those who experience racing thoughts or struggle to organize their thoughts and ideas may appreciate tools designed to support conceptualization processes (Clarify AI). Research is underway to develop a comprehensive framework that redefines skills in the AI era, focusing on the core competencies and pedagogical approaches needed for AI-based education. Research from 2025 identified the need for at least four frameworks: technical understanding of AI systems, practical implementation skills, critical evaluation skills, and ethical considerations. These components are integrated with traditional digital literacy standards through a meta-learning layer that emphasizes adaptability and continuous learning (Baskara, 2025).

There are apps that recognize stressors and provide stress management techniques for learning, work, and personal relationships (RewiredMind). However, in more severe stressful situations, such as traumatic events, professional help is recommended. Research is underway to develop an effective formula for artificial intelligence support for mental health crises and stressful situations. The researchers aim to create a system that can provide a coherent

solution, from preventing daily stress accumulation to counteracting severe stress. The proposed chat system aims to effectively gather information about the causes of stress (Mori et al., 2024).

Decision-making for people who struggle with decision-making or need to verify past data will be made easier with the use of an AI assistant that provides logical suggestions, diverse perspectives, and immediate access to key facts related to previous decisions (Decision). A transdisciplinary research team has developed a publication to examine decision-making processes in the development of an AI-supported mental health app, with a particular focus on ethical considerations, data privacy, and the integration of multidisciplinary perspectives. In recent decades, mental health (especially in young people) has gained attention in the public sphere, among young people themselves, and in academic research discourses. A growing number of young people are reporting symptoms such as depression, anxiety, and other mental health issues and seeking help and support. It was determined that the response to this situation should be addressed by experts and representatives of various backgrounds: medical, philosophical, ethicists, social scientists, experts in artificial intelligence and psychiatry, technology industry leaders, and representatives of people in crisis (Horstkötter et al., 2025). For people with emotion dysregulation, borderline personality disorder or ADHD, describing their current mood and emotional state can help them regain balance and, at the same time, support their creative work and personal expression (Mood to Color GPT).

The teacher's role and suggested pedagogical models

The teacher's role in the context of apps supporting daily functioning goes beyond imparting knowledge. In this area, the teacher serves as a mentor and trainer of self-regulatory skills. They should help students select appropriate tools (e.g., study planning apps, medication reminders, mood logs) and support them in interpreting the data these apps generate. By understanding the specifics of mental disorders, teachers can help students distinguish a temporary decline in their own effectiveness resulting from symptoms from a genuine problem with work organization (Atkins et al., 2010; Fernández-Batanero et al., 2021).

For students with mental health issues, it's crucial that these technologies be used not as a tool for control, but to support independence and foster a sense of agency. Therefore, teachers should implement elements of metacognitive learning (SRL), meaning teaching students how

to plan, monitor, and evaluate their own actions (Aydan, 2025). In practice, this means that applications not only remind students of tasks but also help them understand how and why certain strategies are effective. The teacher or disability advisor then serves as a guide in developing reflective thinking (e.g., by discussing what helped maintain a learning rhythm and what was a source of stress).

The second key approach is Universal Design for Learning (UDL), which posits that learning environments should be flexible and accommodate diverse ways of engaging, learning, and communicating (Veytia Bucheli et al., 2024). In the context of apps supporting daily activities, this means students should be able to choose the tools that best suit their needs—for example, using voice apps instead of text apps, using calendars with visual reminders, or choosing apps with limited stimuli (for those with sensory sensitivities). The teacher's role then is to help students explore these options and adapt them to their individual preferences, as well as to create an open environment where such choices are accepted.

A third model worth considering is Response to Intervention (RtI), which involves gradually adjusting the level of support based on the student's progress (Atkins et al., 2010). In practice, teachers can observe whether a student is able to plan and organize tasks with minimal assistance from the application or whether they require more intensive support (e.g., additional consultations, ongoing monitoring, or specialist recommendations). RtI promotes early detection of problems and responds before difficulties worsen.

Implementing applications that support daily functioning also presents challenges. One of these is technostress, or a sense of technological overload, which affects not only students but also teachers (Fernández-Batanero et al., 2021). A teacher who lacks confidence in using digital tools may unconsciously transmit anxiety and uncertainty to their students. Therefore, it is essential to provide teaching staff with training in technologies that support mental health and foster a culture of openness to experimenting with various forms of support (Delello et al., 2025).

These types of apps can also strengthen the teacher-student relationship. Thanks to progress tracking, reminders, and feedback, teachers can better understand a student's workflow and respond more quickly to signs of crisis (e.g., noticing a student suddenly stops using a tool or

stops reporting their activities). In this way, technology doesn't replace the relationship but can strengthen it, becoming a part of the dialogue about well-being and coping strategies.

In summary, the teacher's role in using tools and applications to support the daily activities of students with mental health disorders involves combining technological knowledge with empathy and understanding. The most effective approach is one that integrates SRL, UDL, and RtI models, thus supporting self-regulation, providing flexibility and a variety of resources, and simultaneously allowing for a graduated level of support. The academic teacher's role in using these tools extends beyond subject teaching and focuses on psychosocial and technological support, shifting the emphasis from traditional teaching to mentoring. In this context, the teacher becomes not only an instructor but also a partner in the process of regaining agency and balance for students with mental health disorders.

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IV. AI Tools Supporting Students on the Autism Spectrum

Introduction to the Topic IV

Reviews of recent literature on artificial intelligence interventions for students with Autism Spectrum Disorder (Adako et al., 2025; Kotsi et al., 2025), especially in compulsory education stages, highlight the potential of AI-based tools to support student learning, as well as the unexplored potential of these tools. Autism is currently defined as a set of behaviors within a single diagnostic category; hence the use of the spectrum concept. This dimension encompasses different levels of severity, defined according to the intensity of symptoms, the impairment they cause in the person's life and their environment, and the level of support required (Volkmar & Pauls, 2018). Thus, Autism Spectrum Disorder (ASD) is defined as a neurodevelopmental disorder characterized by persistent difficulties in communication and social interaction, along with restricted and repetitive patterns of behavior, interests, or activities (APA, 2013, 2022).

University students with ASD experience a series of difficulties and challenges that were analyzed by Van Hees et al. (2015). Among these difficulties were dealing with new situations and unexpected changes, social relationships, problems with information processing, and time management. They found that having to cope with challenges that simultaneously affected their daily life (household tasks), education (university activities), and student life (extracurricular and leisure activities) had an impact on students' well-being. This research provided a series of recommendations: including a personalized approach, coaching across the three domains studied (education, daily life, and student life), sufficient planning and communication within a safe and transparent environment, adequate psychological support, leisure activities, and time for rest. In connection with these recommendations, in this chapter we will review some of the characteristics of students with ASD: difficulties in communication (scenario 13), in their social skills (scenario 14), problems in maintaining attention (scenario 15) and in some executive functions as organization (scenario 16). AI-based tools will be presented, as well as pedagogical guidelines for higher education teachers and students.

SCENARIO 13. Chatbots supporting social communication

Introduction to the Scenario

Individuals with ASD will exhibit alterations in communication and social interaction, which manifest as difficulties in socio-emotional reciprocity. These behaviors range, for example, from displaying unusual social approaches and problems maintaining the normal back-and-forth flow of conversations, to a reduced willingness to share interests, emotions, and affection, and even a failure to initiate or respond to social interaction (Paul & Wilson, 2009).

Another consistently present characteristic relates to problems understanding nonverbal communication, and therefore, understanding the social environment. They show difficulty being sensitive to social reinforcement, as well as sharing objects, activities, or moments of enjoyment, and exhibit little engagement in group activities, which typically cause them discomfort and stress. In most individuals with ASD, a lack of integration between verbal and nonverbal communication is observed, giving the impression of being scattered or having attention deficits, when the real cause is difficulty with joint attention, a failure to perceive the need to attend to what others are attending to, and a failure to recognize what is important, focusing instead on any insignificant element of the context (Barrios et al., 2019).

Furthermore, individuals with ASD show evident difficulties in interpreting facial expressions, which hinders the association of perceived socially relevant information with socially appropriate responses. These difficulties in nonverbal communication patterns imply alterations, both expressive and receptive, in aspects that regulate social interaction, such as the appropriate use of eye contact, gestures, smiling, joint attention patterns, and appropriate responses to the context. Significant difficulties in the development of theory of mind (ToM) are evident, as students with ASD have difficulty understanding and responding to social cues, boundaries, and rules.

The aim of the Scenario

To address their expressed needs, they require access to oral and/or written information and communication through multiple forms of sensory perception (visual and auditory), in line with Universal Design for Learning (UDL) (CAST, 2014). UDL allows for the adaptation of teaching to

promote the participation and success of students with ASD, without stigmatizing or excluding anyone. The application of its principles to ASD involves providing multiple means of representation (Principle 1), such as text, images, pictograms, videos, infographics, or diagrams to aid comprehension and overcome language or abstraction difficulties. Providing multiple means of expression and action (Principle 2) to demonstrate learning, such as oral, written, digital, and manipulative, with the aim of adapting to individual strengths and reducing anxiety; and providing multiple means of engagement (Principle 3) through motivating activities based on personal interests, predictable and structured routines with progressive flexibility, which involves using strategies to manage frustration and sensory overload (Meyer et al., 2014).

This is where the application of AI is most needed, since the use of multimodal facilitators (auditory, graphic, symbolic and gestural) will promote access to oral information and understanding of the social and learning context. Regarding Chatbots supporting social communication, five AI-based tools will be analyzed, although the different scenarios are complementary to each other.

AI Tools Description

There are various AI tools that can support social communication among higher education students diagnosed with Autism Spectrum Disorder (ASD). Below is a brief description of five such tools, highlighting their main contributions. The AIs presented are: FORTA AI, GOOGLE DIALOGFLOW, VERTEX AI, MICROSOFT AZURE BOT FRAMEWORK, and PROLOQUO2GO.

1. FORTA AI

Website:	https://www.forta.org/
Type:	Comprehensive platform applied to behavioural analysis using the Applied Behaviour Analysis (ABA) methodology. This methodology is widely validated for intervention in Autism Spectrum Disorder (ASD). The application of ABA is virtually guided by certified professionals (BCBA) and promotes collaborative intervention (caregivers, teachers, families).
Support Provided:	Early detection and behavioural monitoring. Support for social communication, analysing facial expressions and body language to

	recognise emotions, helping students with ASD to interpret emotions and respond appropriately. – Contribution to the development of social skills. Use of digital tools by students with ASD reduces stress levels and promotes the acquisition of social skills by simulating real-life situations using small talk, including responses for natural, social, and informal conversations. In addition, it helps build confidence by allowing students to practise appropriate responses in a safe environment; it offers empathetic responses by adapting the tone according to the user's emotional state; it reinforces positive behaviours through virtual rewards; and it promotes autonomy and emotional self-regulation. – Personalisation of the learning experience, as it enables academic content to be adapted to the student's cognitive style, provides immediate feedback on progress and difficulties, accelerating progress in managing emotions and behaviours; and uses semantic decomposition to improve understanding of instructions and abstract concepts. – Real-time monitoring with data-driven decision-making, allowing teachers to focus on adapting their strategies and thus addressing students' needs in a personalised manner. In addition, by offering continuous monitoring, it reduces the dependence on constant face-to-face support, although this is irreplaceable and necessary.
Sources & Evidence:	Forta IA is a powerful tool for early detection of ASD and providing personalised educational support (Mollá, 2024), contributing to educational equity (Instituto i360, 2025). In addition to this, it should be noted that cooperation between the family and the educational centre (regardless of the educational stage) is essential to better meet the needs of students with ASD (Murrugarra Retamozo, 2024) and thus ensure the consistency and effectiveness of the methodologies applied (Montesdeoca et al., 2025).

2. GOOGLE DIALOGFLOW

Website:	https://cloud.google.com/products/conversational-agents
Type:	Conversational artificial intelligence tool developed by Google Cloud

Support Provided:	Creation of chatbots and virtual assistants for social and academic interaction. Some of the key features are summarised below: – Natural Language Processing (NLP): applies semantic models to interpret the meaning behind the user's words. This enables it to understand and process natural language and hold fluid conversations with users. It uses intents, entities, contexts, and custom responses to interpret what the user means and respond in a coherent and adaptive manner, enabling accurate interpretation of user input and the generation of customised responses. (ChatIA, n.d.). – Multichannel: allows integration with mobile applications, web platforms, social networks and voice assistants. In addition, it can analyse multiple types of input, whether text or audio (such as from a telephone or voice recording), and respond in different ways, either through text or synthetic voice (Google Cloud, n.d.). – Machine learning, so it improves with use and training. – Multilingual support, allowing conversational experiences to be designed in various languages, making it ideal for global/international projects (ChatIA, n.d.). – Incorporates emotion sentiment techniques to identify emotional indicators in discourse and adjust the response based on context.
Sources & Evidence:	Dialogflow could be key in inclusive educational environments, where AI-based conversational agents can act as mediators to reduce communication barriers and offer adaptive support to students with ASD (Dialogflow Documentation, 2025). The Autism&Uni Project (2020) encourages the use of virtual assistants to improve the university experience for students with ASD. As such, various guides produced by higher education institutions recommend the use of ICTs and conversational platforms to facilitate inclusive teaching (Universidad San Sebastián, 2024), highlighting technologies such as Dialogflow to facilitate planning, organisation and communication for students with ASD (Universidad Autónoma de Madrid, 2020). In addition, there are other experiences in the university setting, such as that presented by Meza (2023), in which a chatbot was developed with Dialogflow for an online psychology course, used by students outside of teaching hours to resolve queries, showing high satisfaction and autonomy.

3. VERTEX AI

Website:	https://cloud.google.com/vertex-ai
Type:	Platform developed by Google Cloud, designed to facilitate the creation, training, deployment, and management of machine learning (ML) models and large language models (LLMs).
Support Provided:	Predictive models for personalising learning. It allows multiple AI tools to be integrated into a single interface, making it a powerful solution for educational applications, especially in inclusive education contexts such as supporting students with ASD. Some of the key features are summarised below: – Model training and deployment: Allows you to create, train, and put machine learning models into production without having to manage the entire infrastructure. Examples include creating virtual assistants, intelligent tutoring systems, and accessibility tools. – Use of pre-trained and customisable models: You can use models already trained by Google (such as for vision, language, or translation) or train your own with your own data. – Integration with Google Cloud, Bigquery, and other tools: Easily connects with Google Cloud services for data analysis, storage, and visualisation. This facilitates data management, performance analysis, and automation of educational tasks. – AutoML: Provides tools so that people without deep experience in AI can automatically train models, adjusting parameters and optimising results. – Pipeline and MLOps: Includes features to automate the entire cycle: data preparation, training, validation, and deployment, following MLOps best practices. – Compatibility with popular frameworks: Supports TensorFlow, PyTorch, Scikit-learn, among others, so you can work with your favourite libraries. – Scalability and security: Designed to handle large volumes of data and ensure information protection. – Access to the latest Gemini models from Google. Gemini (Google's most advanced generative artificial intelligence model) is capable of

	understanding virtually any input thanks to the combination of different types of information and generating almost any output.
Sources & Evidence:	Platforms such as Vertex AI help strengthen the social interaction, language and communication skills of students with ASD, although, as Murrugarra (2024) points out, significant challenges remain, including teacher and/or student training, as well as providing and ensuring that the technological tools offered to students are appropriate to their needs (Autism Online Magazine, 2024). Despite these difficulties, different studies (Hernández-León & Rodríguez-Conde, 2020) emphasise the contribution of artificial intelligence tools, such as Vertex AI, to assessment in university contexts, as they enable personalisation, intelligent tutoring and adapted assessment.

4. MICROSOFT AZURE BOT FRAMEWORK

Website:	https://azure.microsoft.com/es-es/pricing/purchase-options/azure-account/
Type:	Conversational artificial intelligence development platform
Support Provided:	Integration into university environments. It allows you to create, implement, and manage intelligent bots (computer programmes designed to perform tasks automatically, usually simulating human interaction) capable of interacting with users through text, voice, images, and interactive cards. Some of the notable features are summarised below: – Modular and extensible Software Development Kit (SDK) for building custom bots. It consists of independent modules that can be used together or separately, depending on the developer's needs. In addition, functionalities can be expanded without modifying the core of the SDK. All this offers flexibility, customisation and scalability, facilitating integration into different environments and software evolution without breaking the original structure. – Possibility of integration with AI services. For example, with Azure Cognitive Services (LUIS, QnA Maker, Azure OpenAI). – Multichannel and multimodal: The bot is versatile, capable of communicating in different environments and through different forms of interaction, offering a more complete and accessible experience for the user (Microsoft, 2025a). In addition, these bots are capable of

	adapting responses to the emotional and cognitive needs of students with ASD (Microsoft, 2025b). Examples of communication channels include Microsoft Teams, WhatsApp, Facebook Messenger, Slack, Webchat, and mobile applications. This variability of channels enables the same bot to function on different platforms without the need to create separate versions. On the other hand, the multimodal feature means that the bot supports different modes of interaction, such as text, voice, images, buttons, and interactive cards, which improves the user experience by adapting to their needs. – Secure cloud deployment, regulatory compliance and conversation analysis: The bot is hosted on Microsoft Azure infrastructure, which makes it possible, for example, to serve thousands of users without losing performance and to access it anywhere with an internet connection. Azure incorporates advanced measures to protect data and communications (encryption, authentication) as well as complying with international standards and regulations. In terms of conversation analysis, it allows you to record and analyse interactions, detect patterns and measure metrics (satisfaction, response time, topics consulted, etc.), ultimately providing useful information to optimise its performance.
Sources & Evidence:	Campus HelpBot is an intelligent assistant for university students, created with Azure Bot with multiple functionalities, including answering questions about the university, scanning handwritten notes and extracting key information, automatic translation and reading aloud, among others. It is particularly useful for ASD as it offers: a) clear and structured language; b) a safe and predictable environment; c) multimodal functionality (text + voice); and d) personalisation, allowing it to be adapted to guide social and academic interactions. It offers academic and administrative support to university students, including those with ASD, improving their autonomy and communication (Cloudgpt-labs, 2025).

5. PROLOQUO2GO

Website:	https://apps.apple.com/es/app/proloquo2go/id308368164
Type:	Augmentative and Alternative Communication (AAC) application designed for people with speech difficulties, such as those with ASD, available for iOS (iPad).

Support Provided:	AAC tool for effective communication. It allows users to communicate using symbols, text, and synthesised speech. It is widely used in educational, therapeutic, and family settings due to its customisation options, accessibility, and language development capabilities. Some of its key features are summarised below: Symbol-based communication: Proloquo2Go has over 27,000 symbols, allowing it to reach a large number of users with different literacy levels, enabling them to communicate effectively through images or pictograms. – Customisation: Allows you to modify words and appearance to match the user's speaking style, tastes, and visual preferences – Available in four languages: Offers over 100 natural and free voices in several languages (English, Dutch, French, and Spanish). It also supports multiple accents and bilingual use, including switching languages mid-sentence (AssistiveWare, n.d.). – Supports language development: Proloquo2Go's Crescendo™ vocabulary encourages language growth, helping users progress from single words to complex sentences as they develop their language skills. – Accessibility: Compatible with different levels of literacy, fine motor skills, and vision. With 23 pre-programmed button layouts—from 9 to 144 buttons per page—fine motor and visual impairments are covered. It also supports various interaction methods, switches, and keyboards. – Active community and support: In addition to the support team, there is a strong community of users, carers, and professionals who provide resources, advice, and on-the-spot troubleshooting to help you get the most out of the app.
Sources & Evidence:	Various studies and research projects highlight the benefits of Augmentative and Alternative Communication (AAC), including Proloquo2Go, in inclusive education. Some of its main contributions focus on reducing frustration and promoting autonomy in students with ASD (Ariza, 2025). In addition, they significantly improve functional communication and reduce maladaptive behaviours (ABA en Casa, n.d.); not to mention that they contribute to improving the academic and social performance of university students with ASD (Universidad Autónoma de Madrid, 2020; Vidriales et al., 2020).

How AI Supports Students

AI applications assist university students with ASD in several areas:

- Facilitating social communication. For example, FORTA AI enables emotion recognition by analysing facial expressions and body language, helping students with ASD to interpret emotions and respond appropriately, one of their main difficulties. It also supports verbal interaction, especially for non-verbal students or those who have difficulty expressing themselves fluently, by offering conversational interfaces and augmentative communication applications, such as Proloquo2Go. Furthermore, VERTEX AI has text-to-speech and speech-to-text applications, which are very useful for non-verbal students with difficulties in oral expression. PROLOQUO2GO allows emotions, thoughts and needs to be expressed through pictograms, text and speech, making it an essential aid for non-verbal students or those with difficulties in oral expression.
- Contribution to the development of social skills. FORTA AI, GOOGLE DIALOGFLOW, VERTEX AI, and MICROSOFT AZURE BOT FRAMEWORK generate simulations of conversations or social scenarios using small talk, i.e., they include responses for natural, social, and informal conversations (ChatIA, n.d.), thus helping to build confidence by allowing users to practise appropriate responses in a safe environment; offering empathetic responses—adapting the tone according to the user's emotional state—reinforcing positive behaviours through virtual rewards and promoting autonomy and emotional self-regulation.
- Support/assistance in academic interaction. GOOGLE DIALOGFLOW allows integration with LMS (Learning Management System), i.e. technological platforms designed to manage training processes in virtual environments, and also has a personalised virtual assistant that answers specific questions about tasks, assignments, timetables and resources. Also, in MICROSOFT AZURE BOT FRAMEWORK, bots can act as 24/7 virtual tutors within academic communication channels, facilitating barrier-free interaction. On the other hand, PROLOQUO2GO provides essential support by facilitating classroom participation and the expression of opinions.
- Immediate feedback: VERTEX AI can identify specific difficulties in the educational process, offering feedback on language use, tone and content, helping to improve communication. In this way, tailored interventions can be suggested and virtual educational assistants can be created that offer continuous support, answer questions, guide activities and monitor

academic progress. With MICROSOFT AZURE BOT FRAMEWORK, bots can record interactions and offer feedback on communication improvements.

- Personalisation of the learning experience: FORTA AI allows academic content to be adapted to the student's cognitive style, provides immediate feedback on progress and difficulties, and uses semantic decomposition to improve understanding of instructions and abstract concepts. MICROSOFT AZURE BOT FRAMEWORK facilitates the presentation of information in accessible formats (simplified text, voice, images), aiding comprehension for students with ASD.
- Reduction of anxiety and improvement of student autonomy: GOOGLE DIALOGFLOW offers asynchronous interaction (Creatic Icesi, n.d.), which allows students to consult information without the need for direct interaction with the teacher. It also works through predictable routines, which help students anticipate activities and therefore reduce uncertainty. Along with this, it should be noted that VERTEX AI can help structure routines, reminders, and tasks, reducing anxiety and improving autonomy.
- Reduction in disruptive behaviour: by offering a functional means of communication, PROLOQUO2GO helps to reduce frustration and promote a more positive environment (ABA en Casa, n.d.).
- Reduction of communication barriers: FORTA AI collects data on student behaviour and progress, allowing teachers to focus on adapting their strategies and thus addressing students' needs in a personalised manner. In addition, by offering continuous monitoring, it reduces dependence on constant face-to-face support, although this remains irreplaceable and necessary. On the other hand, PROLOQUO2GO improves communication autonomy, making it easier for students to interact with teachers and classmates without relying on interpreters or carers (Apoyo Inclusivo, n.d.).
- Promotion of educational inclusion by facilitating adaptation to cognitive styles, since GOOGLE DIALOGFLOW makes it possible to train in the form of response (visual, textual, or auditory) as well as being accessible through multiple devices and platforms (Devoteam, n.d.). On the other hand, VERTEX AI can transform educational materials into accessible formats (visual, auditory, simplified). PROLOQUO2GO also facilitates integration into university environments, promoting equal opportunities and compliance with accessibility regulations by allowing students with ASD to actively participate in academic and social

activities (facilitating classroom interaction, participation in debates, expression of their own opinions, etc.).

Teacher's Role and pedagogical models suggested to use

The educational inclusion of university students with ASD depends on multiple factors, but teachers are undoubtedly key players. Their role involves pedagogical, digital and socio-emotional skills that enable them to adapt the curriculum and methodologies to diversity.

- Pedagogical and digital skills: Effective teacher training in inclusion involves not only knowledge of regulations but also theoretical and practical mastery of diversity, including Autism Spectrum Disorder. This background is crucial for implementing effective and diversified practices that respond to students' needs. Furthermore, a positive correlation has been identified between continuing education and the success of these adaptations in the classroom (Paladines & Agramonte, 2024). Likewise, training in technological tools such as AAC systems (Proloquo2Go) and AI-based chatbots (Dialogflow) enhances communication and social interaction (Vera et al., 2024). Therefore, as Rentería (2024) argues, "adequate pedagogical training is necessary that addresses both technical and ethical aspects, structured in programmes that prepare teachers to use AI effectively and responsibly in their educational practices" (p. 55).
- Curricular and methodological adaptation: Scientific research identifies curricular flexibility and the application of active methodologies as key factors in achieving positive inclusive experiences (Moreira-Andrade & Cajape-Alcívar, 2024). Thus, for example, the use of multimodal resources reduces cognitive overload and facilitates understanding.
- Personalised monitoring: The use of AI in higher education makes it possible to predict performance patterns and adjust interventions (Corzo-Zavaleta et al., 2025). For example, tools such as Vertex AI and Azure Bot Framework facilitate automated tutoring and immediate feedback, reducing social anxiety and improving autonomy.

Inclusive teaching models are essential for ensuring equity in higher education. Among these, we can highlight the following: Universal Design for Learning (UDL), Competency-Based Learning, Collaborative Learning, and Adapted Gamification.

- Universal Design for Learning (UDL): By promoting teaching centred on students' potential (Montesdeoca-Salazar et al., 2025), UDL has established itself as an effective strategy for addressing diversity in university settings, especially for students with Autism Spectrum Disorder. Its objective is to remove barriers and offer multiple forms of access, participation and expression, thus ensuring that all students can learn equally. Its implementation improves the participation and learning of neurodivergent students, although barriers such as a lack of teacher training remain. Some of the fundamental principles of UDL are summarised below:
    - Diversity in forms of representation: Offer information in a variety of formats (visual, textual, auditory) to facilitate understanding and reduce cognitive overload. Some examples include the use of pictograms or subtitles. Furthermore, as Jiménez (2024) states, 'the results indicate that the effective application of UDL not only improves the participation of students with special educational needs but also benefits the entire student community by promoting more flexible and accessible learning' (p. 1539).
    - Diversity in forms of action and expression: Enable students to demonstrate their learning in a variety of formats (written reports, oral presentations, multimedia projects, simulations, etc.), which promotes autonomy, self-esteem and a sense of belonging among students (Montesdeoca-Salazar et al., 2025), as well as reducing the anxiety associated with traditional assessments.
    - Diversity in forms of involvement: designing personalised activities that connect with students' interests is key to maintaining the motivation of neurodivergent students (Sánchez et al., 2025).

The application of DUA in higher education is based on three pillars. The first is technological integration, for example, the use of tools such as Proloquo2Go enables augmentative communication, while AI platforms such as Dialogflow facilitate social interaction and the resolution of queries. The second is inclusive assessment that promotes the use of flexible rubrics and AI-based adaptive systems to personalise feedback. And the third is ensuring accessible environments, with LMS compatible with screen readers and visual customisation options.

- Competency-Based Learning: Focused on the development of specific and measurable skills, prioritising student autonomy, continuous assessment and personalisation of the pace of learning. Given these characteristics, it is a model that is particularly suitable for students with ASD in higher education, as it allows training processes to be adapted to their individual needs. Some of the fundamental principles of Competency-Based Learning are summarised below:
    - Clear definition of competencies: The competencies to be developed must be explicit and consistent with the learning outcomes. This facilitates self-regulation and reduces uncertainty, which are key aspects when working with students with ASD (Chamba & Borroto, 2025).
    - Continuous and adaptive assessment: Conduct formative assessments, offering immediate feedback. The integration of AI tools such as Vertex AI makes it possible to predict difficulties before they impact performance (Corzo-Zavaleta et al., 2025).
    - Personalisation of learning pace: LMS platforms, which adjust the difficulty and sequence of content according to student progress, promote inclusion and reduce anxiety (Rentería, 2024). If LMSs are also integrated with AAC systems and chatbots (e.g., Dialogflow), they contribute to communication and social interaction.
- Collaborative Learning and Adapted Gamification: Collaborative strategies promote social interaction, motivation, and student engagement. When combined with inclusive gamification, they increase participation, reduce anxiety, and enhance emotional self-regulation (Montesdeoca Salazar et al., 2025). Aspects to consider when using these methodologies with students with ASD would be:
    - Collaborative learning: the roles (of each group member) must be clearly defined. This, combined with the use of moderator bots, allows interactions and conflicts to be managed, strengthening group cohesion, reducing uncertainty and facilitating participation (Sánchez Caicedo et al., 2025).
    - Inclusive gamification: the use of accessible interfaces (pictograms, neutral colours, customisation options), immediate positive reinforcement, unbiased storylines and challenges, avoiding stereotypes and adjusting challenges according to the student's progress and preferences.

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SCENARIO 14. AI tools for personalized progress monitoring and social/communication skills support therapy

Introduction to the Scenario

People with autism exhibit difficulties developing, maintaining, and understanding relationships, which can range from problems adjusting their behavior in different social contexts and difficulties sharing imaginative play or making friends, to, at the extreme, a lack of interest in other people (APA, 2013, 2022). Therefore, difficulty establishing appropriate social relationships is one of the defining characteristics of ASD. Thus, people with ASD typically show little to no spontaneity in initiating social contact or making requests (as if they were unaware that they should). Furthermore, they demonstrate less intention or initiative to initiate approaches and communicative exchanges with others, especially their peers.

They also exhibit difficulties adjusting their behavior to fit into different social contexts, since the set of social relationships is governed by subtle, implicit norms and conventions, full of exceptions and conditions depending on the context—norms that are learned through trial and error. This lack of awareness of social norms in individuals with ASD often leads to behaviour that is inappropriate in each social context (Barrios et al., 2019).

Social and emotional development is not automatic in individuals with ASD, but it can be explicitly taught. Volkmar and Wiesner (2019) propose strategies, based on research and clinical practice, for learning these skills. Thus, to learn basic social skills (in childhood), it is necessary to teach functional (unforced) eye contact, ways to initiate and maintain interactions, understanding of simple social rules, and participation in cooperative games/tasks through modeling, guided practice, and visual aids. Regarding advanced social skills (in young people and adults), the focus is on understanding more subtle social norms, managing conflicts, making and maintaining friendships, participating in more complex conversations, and combining social skills support with emotional education (empathy, recognizing internal states, self-regulation).

Another area to develop is Theory of Mind and social understanding, given the difficulties in understanding mental states. Social stories are proposed as a pedagogical resource to explain situations, along with discussions about emotions using concrete examples, tasks that help

recognize intentions, facial expressions, and nonverbal cues, and activities that involve predicting what another person might think or feel. Regarding communication interventions, considered a central aspect, it is necessary to work on expressive and receptive language, as well as pragmatics—that is, the appropriate use of language according to the context—and Augmentative and Alternative Communication (AAC) systems, using technological devices (ARASAAC, 2025).

Regarding academic learning, support refers to the importance of a structured and predictable environment, the use of routines and anticipation to facilitate learning, with adaptations such as visual instructions, extra time, task breakdown, quiet spaces for self-regulation, visual strategies like visual schedules to anticipate activities, visual scripts to teach sequences (hygiene, schoolwork, social routines), and visual supports to reduce anxiety and improve independence.

The aim of the Scenario

For supportive therapy in the context of ASD, it refers to a set of interventions focused on providing emotional support to the individual, helping them cope with social, communicative, and adaptive difficulties, and improving their well-being and independence. The aim is to promote adjustment and quality of life according to individual needs. Effective treatments typically share the characteristics of being structured, consistent, and individualized, as is the case with Applied Behavior Analysis (ABA), which is based on structured teaching where complex skills are broken down into small steps for progressive learning, positive reinforcement to consolidate learning, systematic measurement of progress, and continuous adjustments. It also includes interventions that utilize technology, such as computers or robots, to foster collaborative play, emotional recognition, and improved socialization (March-Miguez et al., 2018). However, individuals with autism must have access to information and/or oral or written communication, with multiple alternatives for sensory or visual perception. This can be facilitated with the help of adapted materials, technical resources, and/or assistive products (visual anticipators, analog and technological materials, etc.) (Barrios et al., 2019). In this scenario, we will focus on understanding how AI can address these aspects.

AI Tools Description

There are various AI tools that facilitate personalised monitoring of the academic and therapeutic progress of university students with Autism Spectrum Disorder (ASD), especially in the development of social and communication skills. Below is a brief description of five such tools, highlighting their main contributions in relation to the metioned need. The AI tools presented are: LetMeTalk, Grid3, Wysa, Claude and Youper.

1. LETMETALK

Website:	https://apps.apple.com/us/app/letmetalk-talker-saac-caa-sac/id919990138?l=es-MX
Type:	Augmentative and Alternative Communication (AAC) application designed by AppNotize UG (haftungsbeschraenkt) (2014) for people with speech difficulties, such as students with Autism Spectrum Disorder (ASD).
Support Provided:	Uses pictograms, speech synthesis, and a highly customisable interface to facilitate the expression of ideas, emotions, and needs. Some of the most notable features are summarised in (AppNotize UG (haftungsbeschraenkt), 2014): – Augmentative and Alternative Communication (AAC) system: Therefore, it facilitates communication by giving a voice to anyone. It provides a wide range of pictures to choose from to show what they want to convey, and then a voice from the device reads it aloud. In order to use LetMeTalk, it is necessary to have acquired certain knowledge of pictograms and for the person to be familiar with this type of image (Asociación Autismo Huelva, n.d.). – Allows you to create complete sentences by selecting pictures: It features more than 9,000 ARASAAC pictograms. In addition, new images can be added using the mobile phone camera. – Easy to use: Intuitive and simple application in terms of its use, which does not prevent the design of training sessions to optimise its use. – Multilingual: compatible with multiple languages, including Spanish, English, French, Italian, Portuguese, and German. This allows you to reach a large number of users. – Available for Android and iOS and does not require an internet connection to function: This allows communication anywhere, anytime. This enables its widespread use in different contexts, highlighting its effectiveness for communication.

	– Completely free and funded by donations: Free, which facilitates democratisation in access to this support.
Sources & Evidence:	LetmeTalk is positioned as a communication aid (Alcantud & Alonso-Esteban, 2020; Vidriales, 2020), replacing physical PECS (Picture Exchange Communication System) devices. It offers a simple way to communicate using a mobile device and also allows for voice output. Furthermore, it is widely accepted by students as it is a format that motivates (Asociación Autismo Huelva, n.d.). For example, the Confederación Autismo España (Vidriales, 2020) has published a guide to support the incorporation of students with ASD into higher education, which recommends the use of AAC such as LetMeTalk to facilitate access and academic success. On the other hand, in a study conducted by the University of Valencia (Peirats et al., 2019), LetMeTalk was applied in a case of high communicative inflexibility, achieving progress in autonomy and emotional recognition after 37 sessions.

2. GRID3

Website:	https://grid3.org/
Type:	Augmentative and Alternative Communication (AAC) software developed by Smartbox Assistive Technology, designed for people with speech or communication difficulties, such as students with Autism Spectrum Disorder (ASD).
Support Provided:	Versatile and customizable tool that allows users to express themselves through symbols, text, and synthesized speech, facilitating both face-to-face and remote communication, as it offers a wide range of advanced options and vocabularies for all levels, resulting in high-quality communication (Qinera, n.d.). Some of its most outstanding features are summarized below: – Compatibility with different operating systems: Grid3 is a software compatible with iOS and Windows, allowing you to convert a computer or tablet into a communicator. Although dynamic communicators can also be used. – Wide variety of vocabulary, ranging from individual words to complete sentences, organized in thematic categories for easy access: Allows you to create individual profiles with customized vocabularies. This

	facilitates the monitoring of language and communication development. For example, the Voco Chat vocabulary is designed for people with complex access needs or learning difficulties. Grid3 users may include individuals with Autism Spectrum Disorder (ASD), Angelman syndrome, Rett syndrome, spinal muscular atrophy, cerebral palsy, ALS, neuromotor diseases, brain damage, intellectual disability, or others (Qinera, s. f.). – Prediction and correction tools: Includes word prediction and spell-check tools, which facilitates text entry and improves communication fluency (Las mejores aplicaciones, 2024). – Uses Arasaac pictograms, widely recognized in the inclusive educational field: In addition, it allows text and pictogram prediction with Swiftkey technology as well as verbal conjugation for pictograms. – Customizable interface: You can modify the design, size and content of the buttons to suit your preferences and user skills (Las mejores aplicaciones, 2024). – Accessibility: Allows access by touch screen, switches, eye tracking, mouse or keyboard; responding in this way to the preferences and needs of each person being accessible also for students with functional diversity. Synthesized voices: A high-quality variety to pronounce selected words and phrases, helping users communicate effectively with each other (Las mejores aplicaciones, 2024). – Remote communication: Allows through calls, messages, emails, whatsapp, social networks, etc.
Sources & Evidence:	Universal Design for Learning (DUA), together with tools such as Grid3, enhances the participation and learning of students with ASD at university (Autism Online Magazine, 2024; Barrera & Moliner, 2023). Accordingly, in the compendium developed by the Directorate of Student Welfare and Inclusion of the University of San Sebastián (Spain), it is recommended to use ICTs such as Grid3 to facilitate the planning, evaluation and participation of students with ASD in university environments (University of San Sebastian, 2024). In Spain, Qinera offers specialized training in Grid3 for professionals and families, with resources adapted to the local language and culture. Finally, stress that "it is necessary to shift the focus and also focus on the strengths of students and how they can be encouraged and improved" (De la Fuente & Cuesta, 2017, p. 20), hence the use of SAAC as

	Grid3, are essential to facilitate the adaptation and academic performance of university students with ASD.

3. WYSA

Website:	https://www.wysa.com/
Type:	Mental health application that combines artificial intelligence and therapeutic practices to help people cope with emotional and wellness issues.
Support Provided:	Uses artificial intelligence to conduct conversations that help understand the user's emotional state and provide personalized support, tailoring their responses to the user's needs, suggesting coping strategies, relaxation exercises and mindfulness practices to promote well-being. Although not specifically designed for people with ASD (Autism Spectrum Disorder), it can be a useful complementary tool for college students with ASD, especially in the area of personalised monitoring of emotional progress and development of social and communicative skills. Some of the features (Mapa da Família, n.d.; Touchkin, s.f) most prominent are summarized in: – Artificial Intelligence chatbot for mental health: It works as a virtual assistant that offers emotional support through anonymous, confidential and secure (text) conversations at any time. This simulates interactions with a virtual therapist, and helps the user to manage emotions and practice self-care techniques. – Human support options (premium version): In addition to the chatbot, offers sessions with professional coaches for those seeking personalized guidance (Touchkin, s.f). Although interaction with AI may not be sufficient for students who require direct and adapted human support. – Based on psychological therapies and wellness techniques: the application has scientific support, specifically Cognitive-Behavioral Therapy (CBT), Behavioral Dialectical Therapy (DBT), as well as mindfulness exercises, meditation and yoga. – Offers tools to manage emotions and stress: It has more than 40 conversational tools to deal with anxiety, insomnia, loss, anger and worries. The app has a library of guided practices that can be done

	anywhere, helping to manage stress, helping to improve self-esteem and emotional resilience. – Additional functions: Mood recording, allows users to record their emotions over time, making it easier to analyze emotional patterns and identify possible triggers that influence mental health. Wysa also encourages the use of a journal to record thoughts, achievements and moments of gratitude. This practice, based on positive psychology, contributes to a more optimistic outlook and greater emotional well-being. – Accessibility and privacy: Accessibility 24/7, ideal for crisis or need outside professional hours. In addition, it is an application available on iOS and Android, although currently only in English. – Privacy and anonymity: The app offers a secure, confidential space, ideal for those who value privacy when dealing with emotional and mental health issues. Everything is done anonymously, guaranteeing the protection of your data and conversations. This helps reduce fear of judgment, which can be key for students with social anxiety.
Sources & Evidence:	Exploring the needs of university students with ASD, especially during their first year of university, is key to helping them successfully cope with the high demands of university life. Thus, social interactions play a key role in the retention and success at university in students with ASD (Petcu et al., 2021); therefore it is essential to offer effective services and supports for this student. That is why, based on other evidence, such as the results of the iWellness study, led by Leslie Tarver at Harvard University (2023), which showed that Wysa significantly improved symptoms of anxiety and depression, stands out as an alternative to value.

4. CLAUDE

Website:	https://claude.com/product/overview
Type:	It is a large-scale language model (LLM) developed by Anthropic, designed to interact using natural language and perform complex tasks such as analysis, writing, programming and content generation.
Support Provided:	Allows for natural, empathic and contextually accurate conversations, as well as understanding the emotional state to provide adaptive responses. Especially useful for students with ASD who need safe, structured and

	emotionally stable conversational environments. Its ethical design makes it ideal for sensitive therapeutic and educational contexts such as studies. Some of the most notable features (Arimetrics, n.d.; CclopsKnowledge, n.d; Xataka Basics, n.d.) are summarized in: – Focus on Constitutional AI: is trained following predefined ethical principles, inspired by documents such as the Universal Declaration of Human Rights. This reduces bias and harmful responses, ensuring transparency and security. – Natural conversation: Generate responses that sound less "robotic," use varied vocabulary, less predictable structure, more conversational tone. Asks clarification questions before answering. – Deep understanding of language: capable of interpreting complex questions, offering clear explanations and structures, maintaining consistent interactions and adapting to context. Thus it supports the teaching and learning process. – Ability for emotional and linguistic analysis: Provides a safe and ethical interaction, designed to reduce the risks of inappropriate responses and promotes confidence in the interaction. – Multimodal: In addition to text, the latest versions can work with images and documents, although their main focus remains on text. In this way, it allows adaptation to the student's learning style (visual, verbal, textual), which facilitates adjustment to university contexts and individual needs. – Student support resources can be expanded by integrating with Augmented Communication apps and virtual environments. – Cross-platform accessibility: Available via web, API and through cloud providers such as Amazon Bedrock and Google Cloud Vertex A – Scalability and performance: Can process up to 200,000 tokens (approx. 150,000 words), allowing you to manage large volumes of information and perform tasks such as document analysis, content generation and research assistance – Availability 24/7: Access can be made at any time, allowing for autonomous practice – Privacy and control: Anthropic has designed Claude to minimize risks related to sensitive data and avoid responses that could cause harm.

	– Free version: Available free for Windows, macOS, Android, iOS and Web, with basic functions such as chat, text generation and document analysis (Gizmodo, n.d.). – Claude for Education: specialized version for higher education institution.
Sources & Evidence:	Claude is mainly used to create (39.8%) and analyze (30.2%) academic content, especially in STEM areas (Anthropic, 2025a). However, risks of cognitive externalization, lack of regulation and the need for ethical alignment are identified (Castillo-Martínez et al., 2024). Claude's Learning Mode, designed to foster critical thinking through Socratic dialogue and academic templates (Anthropic, 2025b), positions it as a potentially useful tool for students with ASD, when combined with inclusive teaching strategies and teacher supervisión.

5. YOUPER

Website:	https://www.youper.ai/
Type:	Application of mental health based on artificial intelligence that provides emotional and psychological support through an interactive chatbot.
Support Provided:	Facilitate emotional well-being by helping users manage anxiety, depression and stress through guided conversations and short exercises, without replacing professional therapy. Although not specifically designed for people with Autism Spectrum Disorder (ASD), it can be a complementary tool to promote emotional regulation and social practice. Its main characteristics can be summarised as follows: – Uses a chatbot with personalized AI: Maintains natural conversations in which questions are asked to understand the emotional state of the person in order to offer answers and exercises adapted to the needs and therefore a personalized experience (NavTo.AI., 2025; Isaac, 2025). It is designed to be a first approach to coping with emotional problems, providing instant support anytime and anywhere. – Evidence-Based Interventions: It is based on treatments that have been studied and clinically validated, demonstrating efficacy in the reduction of symptoms of anxiety and depression (NavTo.AI., 2025). Thus the techniques incorporated in Youper (Chatbot Clinics of Physiotherapy, 2025) are cognitive restructuring (aimed at combating negative

	thoughts); deep breathing (to reduce anxiety), gratitude daily (focusing attention on the positive of each day) and behavioral activation (aimed at overcoming apathy with micro-actions). – Practical exercises and follow-up: Offers short sessions (2-10 minutes) to work on breathing, gratitude or behavioral activation, which act as gentle reminders to create self-care habits. In addition, the application allows you to keep track of your emotional evolution over time (Chatbot Clínicas de Fisioterapia, 2025; Isaac, 2025). – Accessibility and availability: It works on mobile devices and has an intuitive and multilingual interface, being able to access at any time and place, offering a 24/7 service for immediate support. Ideal as immediate support in times of anxiety (AIToolsSpace, 2025). – Guaranteed security and privacy: Meets medical data protection standards, ensuring that information is not shared with third parties (Google Play, 2025). – Extra to traditional therapy: complements, although does not replace the work of a psychologist or psychiatrist, but serves as a preventive and accompanying tool (Chatbot Clínicas de Fisioterapia, 2025). Youper can be easily integrated into existing care workflows, expanding the reach of health professionals.
Sources & Evidence:	Research on the inclusion of students with ASD at university highlights the need to implement specific programs that provide emotional, academic and social support (Alcantud-Marín & Alonso-Esteban, 2021; Vidriales et al., 2020). Despite the high levels of resilience manifested by some students, such strength does not guarantee stable emotional well-being (Fabri et al., 2020), especially in the face of demands from the university environment. That is why, digital tools oriented to mental health, such as Youper, have shown promising results by significantly reducing symptoms of anxiety and depression (Mehta et al., 2021).

How AI Supports Students

Artificial intelligence (AI) is transforming the way in which personalized monitoring of the academic and therapeutic progress of university students with autism spectrum disorder (ASD), especially in the development of social and communicative skills. Thus, some of the benefits of these AI tools for university students with ASD are summarized/focused on:

- Enhances communicative autonomy: AACs facilitate communication for non-verbal students or those with expressive difficulties, promoting functional language use and emotional understanding through pictograms (Marzal & Fuster, 2025). For example, the continued use of LetMeTalk, Grid3 or Claude allows students to become independent in expressing their ideas and emotions, contributing to both reduced anxiety and frustration, as well as improved self-esteem and active participation.
- Development of social skills: Applications such as LetMeTalk, Grid3 orClaude (Koegel et al., 2025) integrate AI to simulate conversations, train social responses and improve interaction with peers and teachers. This allows students with ASD to express ideas, emotions, and needs through symbols or text. These apps can be used in individual or group sessions, facilitating social skills training (Kotsi et al., 2025) with immediate feedback. In addition, social robots and virtual assistants with AI act as therapeutic mediators, guiding students in simulated social situations (Jaramillo, n.d.), promoting progressive desensitisation to social situations through safe practice.
    - Autonomy and emotional well-being: AI technologies can support people with autism in their daily living skills. AACs such as LetMeTalk or Grid3, by supporting the communication process, reduce anxiety and frustration, promoting self-esteem and well-being. AI-enabled wearable devices can also help people manage their personal schedules, reminders, and alerts for self-care activities. This contributes to emotional empowerment, strengthening autonomy, improving self-management skills and increasing overall independence (McClure, n.d.). In short, it provides significant support for personal development and mental health care (Android Help, n.d.).
    - Supportive social skills therapy: LetMeTalk, Grid3, and Wysa support simulated social interactions, such as role-playing, academic routines, and collaborative activities. In addition, Wysa offers messages of encouragement and validation that can strengthen self-esteem and motivation to interact with others. These tools can complement face-to-face therapy and provide support between sessions with psychologists or specialised therapists, but they do not replace specialised professional intervention for ASD.
    - Personalised progress tracking: For example, LetMeTalk, Grid and Claude allow users to create individual profiles, enabling them to customise categories, pictures and speech speed, which facilitates monitoring of the process of acquiring communication skills. Teachers can monitor the complexity of the sentences constructed, the use of

pictograms, and the frequency of interaction, providing data that allows for the adjustment of educational strategies (Marzal & Fuster, 2025). On the other hand, both Wysa and Claude allow for personalised monitoring of emotional and social well-being by recording moods, while also offering a non-invasive experience as they are completely virtual. In addition, Claude can be integrated with educational platforms to provide continuous feedback and adjustment of teaching strategies (Herrero-Martín et al., 2024).

- Promotes inclusion in higher education: This is a benefit identified in other educational stages (Marzal & Fuster, 2025) but transferable to the university context. LetMeTalk and Grid3 promote a more inclusive academic experience by facilitating both individual and group participation, as well as tutoring and extracurricular activities. This eliminates barriers that hinder educational inclusion. Furthermore, as stated in the guide published by Autism&Uni (2016), Grid3 can be integrated into Individualised Support Plans (ISPs) and Universal Design for Learning (UDL) strategies.

Teacher's Role and pedagogical models suggested to use

The effective inclusion of students with Autism Spectrum Disorder (ASD) in university does not depend solely on the availability of technological resources, but also on teacher training in this area (Moliner, 2019) and their active involvement in creating accessible and emotionally safe environments. In short, an effective commitment to reducing the educational barriers faced by these students (Crespo, 2024). In this way, **the teacher is a guide, a mediator between the curriculum, technology and the needs of the students, which requires specific skills in three dimensions: pedagogical, digital and socio-emotional.**

- Teaching skills: Linked to adapting the curriculum using Universal Design for Learning (UDL) principles, ensuring multiple forms of representation, expression and engagement.
- Digital skills: Knowledge and use of AI-based applications (e.g., LETMETALK, GRID3, WYSA, CLAUDE, YOUPER) to facilitate communication, accessibility, and emotional wellbeing.
- Social-emotional skills: Developing skills to detect signs of anxiety, stress or sensory overload, and coordinating support with university services. In this regard, it is important to note that the teaching role is not performed in an individual way; rather, in order to be effective, it requires coordination with: guidance services, which identify students' needs

and propose adaptations to address them; educational technology teams—which resolve questions and provide ongoing training in AI—and families and support networks—support agents, as long as the students require and agree to this, as they are adults.

On the other hand, the inclusion of students with ASD in higher education requires **pedagogical models** that respond to cognitive, communicative, and socio-emotional diversity. Among the most relevant approaches are:

- Universal Design for Learning (UDL): UDL offers multiple forms of representation and expression, allowing content and activities to be adapted to different learning styles. It is therefore positioned as an effective strategy for addressing diversity in university settings, especially for students with autism spectrum disorder. As Barrera and Moliner (2023) suggest, UDL improves participation if applied sensitively. On a practical level, this translates into the use of diverse materials, flexibility in the format of task delivery (oral, written, digital) and the use of strategies to reduce sensory overload and promote self-regulation.
- Personalised and adaptive learning: This model focuses on adjusting the pace (progress monitoring), difficulty (content recommendations based on level) and resources to individual needs (detecting emotional or cognitive difficulties), hence its suitability for use with students with ASD.
- Collaborative learning: Difficulties in social interaction are a common characteristic among students with ASD, which is why teamwork can be challenging. Therefore, having digital tools that facilitate this task is key, as they help to structure communication, define roles and divide tasks, or work in virtual spaces that reduce social anxiety.
- Social-emotional support strategies: Academic success depends on several factors, but being able to identify and regulate one's emotions is one of them. To do this, it is essential to establish routines and integrate applications for emotional management and self-care, such as Youper or Claude.

In summary, **a series of tips are included for integrating AI into teaching practice**, thereby responding to the diversity present in university classrooms.

- Personalised initial assessment: It is essential to get to know the students and their needs (communicative, cognitive and emotional) to choose the most appropriate tool.

- AI-mediated tutoring: Use of tools such as CLAUDE or YOUPER to reinforce content and provide immediate, personalised feedback.
- Designing hybrid environments: Leveraging the potential of face-to-face and digital resources, combining them to maximise their impact and promote student autonomy. For example, integrating face-to-face classes with digital applications such as LETMETALK, which facilitates augmentative communication, or WYSA, which is geared towards emotional support.
- Assisted collaborative learning: Incorporate GRID3 to facilitate interaction in group projects, reducing communication barriers.
- Data tracking and analysis: Use data generated by applications to adjust teaching strategies and prevent emotional problems.

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SCENARIO 15. Real-time transcription apps

Introduction to the Scenario

Sustained attention is the ability to remain focused on a task or stimulus for an extended period of time. In the context of Autism Spectrum Disorder (ASD), this attentional function is often affected, although to varying degrees depending on age, cognitive level, and comorbidity with other disorders such as Attention Deficit Hyperactivity Disorder (ADHD).

Many children with ASD can hyperfocus on restricted stimuli, showing great attention to topics of personal interest, but have difficulty maintaining attention on unmotivating tasks. Students with ASD can demonstrate excellent levels of sustained attention on tasks they find rewarding or motivating. However, when faced with schoolwork, social situations, or less appealing activities, they may exhibit low resistance to distraction and have difficulty inhibiting or withdrawing their attention from irrelevant stimuli (such as ambient noise). Given their vulnerability to distractions, even though they can concentrate intensely on their interests, they can be easily distracted by irrelevant external stimuli when the task is not inherently engaging (Barrios et al., 2019; Demetriu et al., 2019).

Furthermore, in order to avoid sensory overload, individuals with autism acquire voluntary and involuntary strategies and compensations, such as monoprocessing, when they focus their attention on a single channel, or *tunnel vision*, when they concentrate on a detail instead of the whole. Therefore, in an overstimulating or chaotic environment, the difficulty of sustained attention increases. However, although hyperfocus may seemingly improve attention, it limits the ability to transfer it to other tasks (Demetriu et al., 2019).

This characteristic trait of autism has functional implications in the school or learning environment, such as difficulty completing long tasks, following sequential instructions, or participating in group activities. It also affects social relationships, as individuals with autism may miss relevant social information if they cannot sustain attention during conversations or collaborative games. Furthermore, it impacts their daily independence due to distractibility when trying to complete tasks without supervision.

The difficulties are more pronounced when ADHD is comorbid, especially in inattention and impulsivity. The study by Demetriou et al. (2018) on executive functions in ASD shows that sustained attention is one of the affected areas, along with planning, cognitive flexibility, and inhibition. Furthermore, stress, anxiety, or frustration can further reduce the ability to maintain attention. Therefore, according to Muñoz and Ronsero (2023), these difficulties can have implications for learning and school and social adjustment, since the ability to maintain attention is key to processing information and following instructions.

Intervention strategies focus on scheduling short, structured activities that reinforce attention, incorporating visual and cognitive support strategies (visual schedules, to-do lists, etc.) to facilitate concentration, and continuously monitoring attention to adapt tasks to the needs of students with ASD (Muñoz & Rosero, 2023). Furthermore, according to Demetriou (2018), it will be necessary to establish breaks and adapt the content to the interests of students with ASD to increase intrinsic motivation.

Complementarily, environment must be well organized and controlled, with minimal distractions and adapting the timing of activities to the age and attention span, facilitating the creation of habits, routines, and task organization with connectors that allow them to anticipate activities, to facilitate attentional shifts, enabling them to focus on what is important in that moment and with it the associations of their learning, in order to develop strategies for autonomous learning (Barrios et al., 2019).

The aim of the Scenario

In this scenario, aimed at higher education faculty, technical staff, and students, AI-based tools are presented that perform real-time transcription to help focus attention. These technologies employ **Automatic Speech Recognition** (ASR). Sound waves are analyzed by the system, which detects phonemes and acoustic patterns and converts them into words. **Natural Language Processing** (NLP) techniques can also be applied to improve accuracy, contextual understanding, insert punctuation, or distinguish between different speakers.

Transcriptions can be done in real time, providing students with a written transcript as the conversation unfolds. In general, these applications are an excellent tool for providing automatic notes for classes, meetings, lectures, or interviews. Regarding audiovisual material,

they can generate automatic subtitles for both videos and live streams. In multilingual contexts, they facilitate communication, as they can support different languages.

AI Tools Description

The following are five AI-based tools that enable real-time transcription of materials in audio, video, or written text format: Otter.AI, NaturalReader, Speechify, Sonix, and Word Online.

1. Otter.AI

Website:	https://otter.ai/
Type:	AI-based tool that performs automatic, real-time transcriptions of face-to-face classes, video conferences, or academic meetings.
Support Provided:	This tool enables speech recognition, instantly converting spoken language into text. Its features include speaker identification, keyword search, summary generation, and synchronization with educational platforms. All of this reduces cognitive load and anxiety for students with ASD. It can be used with long classes or multiple speakers, as it distinguishes accents and individuals. It can be integrated with platforms such as Zoom or Meet. It allows for reviewing, sharing, and editing transcripts. Some of its contributions to people with ASD include: – It reduces mental strain and anxiety when performing the task of taking notes simultaneously with live conversations. – It provides multimodal support (audio and text), which helps to process complex information. ,. – Information structuring and self-regulation of learning. Texts provided are reviewable and searchable by keyword, allowing the identification of specific fragments for reviewing information based on student needs. – It improves pragmatic understanding by providing time to analyze the phrases and examples provided in conversations in real time.

2. NaturalReader

Website:	https://www.naturalreaders.com/

Type:	Text-to-speech (TTS) software.
Support Provided:	NaturalReader is a text-to-audio converter. It can be used with documents, web pages, articles, or notes (supporting more than 20 formats) which are generated as playable audio with a natural-sounding voice (more than 200 AI-generated natural voices). Its use improves information accessibility and reduces cognitive load. It is also available in more than 50 languages. Regarding students with ASD: – It facilitates reading comprehension by enabling access to information through two channels (visual and auditory), making it possible to alternate between reading and listening. – It provides multimodal support (audio and text), which helps to process complex information. – It reduces sensory and cognitive load by enabling to listen information at an adjustable pace. – It improves emotional regulation. Students can listen to the audio while performing physical activities that can help them self-regulate. – It promotes student autonomy, since students can manage the information provided at their own rhythm.

3. Speechify

Website:	https://speechify.com/
Author:	Cliff Weitzman
Type:	Text-to-speech (TTS) software.
Support Provided:	An AI-based tool that converts text to audio (TTS) using AI-generated voices. It can be used on various platforms: as a mobile app (iOS and Android), a desktop program, or as a browser extension (Safari, Chrome, etc.). It makes various text sources accessible: web articles, ebooks, physical books (using optical character recognition technology), and documents (PDF, Word, etc.). It also offers voice-to-text (dictation or voice typing) functionality. – It improves students' communicative fluency by converting their oral discourse into a written text. – It reduces cognitive load, as it facilitates the subsequent use of materials (notes, memos, etc.).

	– It reduces frustration from typos or slow typing.

4. Sonix

Website:	https://sonix.ai/es
Author:	Jamie Sutherland, David Dat Nguyen & Stephen Hopkins
Type:	Multi-language automated transcription and subtitling platform. Audio or video converter into text.
Support Provided:	Converts audio or video into highly accurate text, allowing for editing, subtitling, and translation of the transcribed information. It supports multiple languages and can perform automatic translations (over 54 languages). Furthermore, it uses timestamps, making it an ideal tool for student projects such as final degree projects. It allows for speaker identification and generates subtitles. Documents can be downloaded in multiple formats (Word, PDF, subtitles, or edited files for video projects).

5. Word online

Website:	https://word.cloud.microsoft/es-es/
Type:	Word processor that includes AI-powered transcription features.
Support Provided:	Integrated into the Microsoft 365 suite, the online Word processor includes features that may be of interest to students with ASD, such as audio-to-text transcription, voice dictation, editing, rewriting, translation, and immersive reading. Among its features, the following stand out for students with ASD: – It facilitates reading comprehension and concentration through multimodal support and the immersive reading option. – It reduces cognitive load by enabling flexible information processing and organizing information in a widely known format. – It provides a clear routine and security. – It offers translation in several languages and allows reading complete texts in other languages, reducing cognitive load.

How AI Supports Students

Attention, communication, and organizational difficulties experienced by students with ASD can be minimized through the use of technology (Sánchez-Romero & García-Vacas, 2025). This supports the usefulness of tools that facilitate real-time transcription. As Fitas (2025) points out, AI-based tools that provide automatic subtitling, real-time transcription, or personalized learning pace promote educational inclusion and access to information.

This chapter has recommended some of the AI-based tools available on the market that help focus attention by allowing it to be directed to a single communication channel. We can find references that support their use with students with ASD. Lawton (2025) reviewed the role of AI in education and the application of specific tools. Regarding Otter.AI and students with ASD, he noted that it can promote student engagement and participation, improve information recall in reading comprehension tasks, and foster autonomy. Furthermore, he points out that it is an effective tool for helping students become aware of how to structure information, highlighting stress relief associated with writing tasks and an improvement of their confidence in their communication abilities. Flood (2007) highlights the use of NaturaReader as reading software for less visible forms of diversity than physical disabilities, such as learning difficulties. Chukwuemeka & Agbarakwe (2024) conducted research in which they identified the benefits of Speechify in students with dyslexia in relation to their reading comprehension, although they indicate that its use is suitable for students with ASD.

In general, the AIs indicated in this scenario provide the following support to students with ASD:

- They guarantee universal accessibility.
- Reduction of cognitive and sensory load. They allow them to focus on one task and avoid simultaneously listening, reading, and writing.
- They provide multimodal support for studying.
- They promote written communication through dictation, avoiding the pressure of rapid writing.
- They allow for emotional self-regulation by making it possible to combine studies while performing some type of physical activity. For example, while listening to recordings of materials.
- It increases autonomy in note-taking, studying, and reviewing.

- It facilitates access to information through accessible readings and in a multimodal way (audio, text or video).
- It improves the understanding of lectures, seminars, and other situations where the pace of speech may be faster than the students' information processing.

Privacy policies and regulatory compliance (data protection, etc.) must be taken into account. Therefore, before using any tool, permission should be requested, or it should be determined whether the materials are modifiable or have any type of copyright that prevents their modification.

Some limitations of these tools to keep in mind are that the transcriptions may not be entirely accurate. There may be errors, including spelling mistakes and omissions of information. Furthermore, it's advisable to review the privacy policy, as many tools send audio files to servers for processing. Additionally, free versions of the applications often have limits on the number of minutes, the maximum recording duration, and other restrictions.

Teacher's Role and pedagogical models suggested to use

Firstly, we must be aware that these technologies do not replace teachers, but rather complement their teaching work, allowing students to participate based on their strengths and address their individual needs.

When using AI-based tools for real-time transcription, it is essential to review the existence of ethical use and data protection protocols. Students must be authorized to use these tools and be aware that recordings or transcripts cannot be shared without their consent. Using institutional platforms can mitigate unnecessary risks.

When using these types of AI-based tools, a series of actions are recommended to teachers based on three stages:

- **Before the class,** teachers can provide materials (slides, diagrams, key concepts, etc.). It is preferable that these materials be provided in an accessible format (Word, PDF, etc.). In addition, teachers should inform students that they can use support tools during the class.

- During class, it is important for teachers to be aware that transcription tools require a suitable pace and brief pauses to allow for synchronization. It is best to avoid abrupt changes in topic and use verbal cues to emphasize key steps (e.g., "Now, to summarize, this concept is central..."). Depending on the tool used, students may need to wear headphones in class, which teachers should allow.
- After the class, the instructors could be available to answer questions about the content with visual and written support. They could upload recordings of the session, if they are the ones using the tools, or provide summaries or the texts generated during the session.

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SCENARIO 16. Tools assisting in note-taking and organization

Introduction to the Scenario

Executive functions (EF) are internally self-directed cognitive skills used to achieve a goal. This set of higher cognitive abilities, which allows us to plan, organize, regulate, and monitor behaviour to achieve objectives, includes *planning*, or the ordering of our actions to achieve a goal; *organization*, which consists of structuring information and activities; *inhibitory control*, or the restraint of impulsive or inappropriate responses; and *cognitive flexibility*, as the ability to adapt to changes or new situations, among others.

In relation to this, the behaviour and thinking of people with ASD is characterized by inflexibility and rigidity, visible in the presence of repetitive behaviours and interests, and also manifesting itself in the processes of decision-making, or in the planning, organization and problem-solving, which allows anticipating difficulties and organizing time effectively (Barrios et al., 2019).

Thus, these executive control difficulties, or executive dysfunctions (Cahuana et al., 2024), directly affect the ability to concentrate, the ability to discard irrelevant information, recall information effectively, control impulses, and manage work or study (Boza, 2025). Therefore, they limit students' autonomy when performing tasks, as they have trouble determining where to begin, what steps to follow, and how much time and space to dedicate to solving a task. Consequently, following the author's argument, it is necessary to train these skills, and this explicit work on learning executive functions should be included in both face-to-face and virtual classrooms.

In this sense, Universal Design for Learning (UDL), based on educational research, technologies, neuroscience, and educational practice, adopts an inclusive view of teaching with proposals for its application in practice (Alba, 2019), presenting three principles: multiple ways of representing information, multiple ways of acting and expressing learning, and providing multiple ways of involvement, to be applied in the reality of classrooms. Within the 2nd principle*, Offering multiple means for action and expression*, guideline 6 makes direct reference to *Providing options for executive functions*, with resources such as guides and checklists to help set goals, self-instructions, tutors who model the process of thinking aloud, examples of the process and product of setting goals, questions and aids to stimulate effort, resources and

difficulty required by a task, instructions to stop and think before acting, checklists and planning templates for establishing lists of steps, problem-solving strategies, guides to break long-term goals into short-term objectives, rubrics (self-assessment and self-reflection), guided questions for self-monitoring, representations of progress, being concrete indications to improve these skills so important for learning and the acquisition of knowledge (DUALTIC Project, 2015). In this sense, intervention in special education is approached from an inclusive perspective, with proposals that will benefit any student who needs this support, since there is also a lot of variability in needs and evident differences in autism spectrum disorder (ASD).

The aim of the Scenario

To facilitate autonomy, learning, and daily life for students with ASD, this scenario provides AI-based tools that help students organize themselves, take notes, plan tasks, and avoid distractions. The difficulties or differences in executive functions experienced by students with ASD mean they require support to structure, control, and maintain consistency in their daily tasks. The proposed tools offer visual organization, task breakdown, reminders and notifications, customization, and accessibility from various devices, among other features.

AI Tools Description

Five tools have been selected in relation to this scenario, which are discussed below: Notion, Tiimo, Goblin Tools, Obsidian, and Focus Bear.

1. Notion

Website:	https://www.notion.com/
Type:	A digital platform that allows to manage tasks and projects, take notes, and organize in a personalized and collaborative way through calendars and wikis.
Support Provided:	It shifts repetitive tasks and organizes information in an external space, helping to reduce cognitive load and improve decision-making in planning and time management. It includes templates specifically designed for individuals with ASD or neurodivergent personality traits. Main benefits related to students with ASD:

	- It reduces cognitive load by providing structure and organization to both daily and non-routine tasks. - Support in executive functions: organization, memory, task initiation, follow-up. - It reduces uncertainty and anxiety by allowing them to control the status of academic tasks (unsettled, in progress, completed). - It promotes autonomy since students can independently manage the organization of tasks. - Time management: It has calendars, provides reminders, helps with planning and avoids the accumulation of tasks. - Personalized visual environments adapted to your cognitive style.

2. Tiimo

Website:	tiimoapp.com
Author:	Helene Lassen Nørlem and Melissa Würtz Azari
Type:	Tiimo is a daily planning and reflection app with a visual design that was created from the beginning for neurodivergent people.
Support Provided:	Turn the day into a visual timeline plan using lists and reminders. It provides focus timers, color-coded calendars, and even takes emotions into account. Regarding students with ASD, this tool can be helpful in the following ways: - Tracking emotions. - Information about ASD with a specific blog that provides articles. - Reduction of cognitive load, by providing structure and organization to both daily and non-routine tasks, allowing them to be organized by priority. - Support in executive functions: organization, memory, task initiation, follow-up. - Reduction of uncertainty and anxiety by being able to control the tasks to be performed. - It promotes autonomy since students can independently manage the organization of tasks. - Time management: It has calendars, provides reminders, helps to plan and avoid the accumulation of tasks.

	- Personalized visual environments adapted to different cognitive styles.

3. Goblin Tools

Website:	https://goblin.tools/
Author:	Bram De Buyser
Type:	A web platform that brings together several AI-based tools that simplify cognitive tasks, initially designed for neurodivergent people (Spoor & Walkowiak, 2024).
Support Provided:	Each of the tools provided by Goblin has a function: Magic ToDo simplifies complex tasks into simpler actions. – Formalizer transforms texts or ideas based on more than ten different tones (e.g., formal, passionate, technical). It allows them to clarify confusing ideas into more organized and appropriate ones for a communicative situation. – Judge offers feedback on the meaning and tone of the messages received, allowing analysis of whether the information received has been properly understood. – The professor provides information and examples of what is being asked. – The consultant analyzes the pros and cons of a situation, providing an answer that takes both elements into account. – Estimator gives an approximation of the time it may take to perform a task. – Compiler designs a list of tasks based on reflection. – The Chef makes a culinary proposal from a list of ingredients. In general terms, *Goblin tools* is an AI-based appliance that simplifies, organizes, clarifies, and generates ideas. It also helps them to understand and convey emotions associated with messages. It is a tool completely free and available for both Android and iOS. Regarding students with ASD, this set of tools can help them to manage and reduce cognitive load, organize ideas and information, support communication and social demands, and cognitive and emotional regulation.

4. Obsidian

Website:	https://obsidian.md/
Author:	Shida Li & Erica Xu
Type:	Markdown-based note-taking application.
Facilitated support:	It allows them to create a knowledge vault where all notes are interconnected through bidirectional links. These cross-referenced notes generate a visual knowledge map that facilitates structured thinking and information retrieval. Therefore, it is not just a notepad, but a system that combines notes, connections, charts, tags, templates, plugins, and automations. Other notable aspects: – Develop clear, structured, and consistent notes. Proportionate templates for lecture notes, academic readings, summaries, and reports. – It facilitates deep understanding by linking ideas. It enables them to visualize relationships and facilitates the integration of knowledge. – It provides graphics and visual maps. – The Obsidian community offers various plugins with numerous features. The Obsidian AI Assistant or Text Generator plugin creates automatic summaries and simplifies complex texts. Others facilitate time management and planning. They include calendars, daily notes, task boards, time blocks, and Pomodoro-style study tracking. Regarding students with ASD, this tool may be of interest to: – Organize thoughts. – Development of cognitive functions such as planning, prioritization, or sequencing. – Relieve the burden of cognitive or sensory overload. – Task tracking.

5. Focus Bear

Website:	https://www.focusbear.io/
Author:	Jeremy Nagel

Type:	An application designed to improve productivity, track habits, and manage time; it is initially designed for people with ASD or ADHD.
Support Provided:	Its functions include: – Distraction blocking on all devices. – Creation and monitoring of morning and evening routines. – Reminders for breaks to increase productivity. – Information on achievements. Regarding students with ASD, Focus Bear promotes: – Organizing tasks, relieving cognitive overload. – Build healthy habits (meditation, exercise, journaling, etc.) – Focus by blocking out distractions.

How AI Supports Students

Dijkhuis et al. (2020) point out that many university students with ASD drop out of their studies prematurely. In a study of 54 adults with ASD, they identified that executive functions play a fundamental role in academic success compared to other predictors such as IQ. They conclude that improving the executive functions of students with ASD could have an impact on both their academic success and their quality of life. Among the executive functions measured by Dijkhuis et al. (2020) identified emotional control, working memory, and task planning and organization as key executive functions. These executive functions are related to the tools discussed in this scenario (Notion, Tiimo, Goblin Tools, Obsidian, and Focus Bear).

Regarding Tiimo, we found several studies analyzing its use by people with ASD. Rehman et al. (2021) conducted research analyzing 250 AI-based mobile applications designed to meet the needs of people with ASD. After an initial selection, the study narrowed it down to 25 applications, including Tiimo. This application incorporates many of the features identified in the study as useful for people with ASD (visualization, notifications, and personalization). Spoor et al. (2024) highlighted Tiimo's potential within organizations for HR personnel with autism. They indicated its use in connection with the development of executive functions, for example, in relation to organizing task status. Furthermore, they noted that users of the premium version felt more confident in managing their work and that the application had contributed to stress reduction. We can also get information about when support for students with ASD is most

appropriate in monitoring their routines. Thus, Otto et al. (2022) indicated that the Tiimo app was used more frequently in the mornings, with an average of fewer than five activities per day. Additionally, Santamaria & Auger (2023) indicated that Notion can be a useful tool for students with ASD to reduce cognitive load and improve decision-making.

The university environment can disrupt routines that were consistently established during previous educational stages. Van Hees et al. (2014) highlighted the importance of providing students with support for planning and creating clear routines, which aligns with the possibilities offered by Focus Bear and Tiimo. The applications offered also support students' daily lives; tasks such as preparing lunch after classes can present a challenge that students may not have previously faced. Goblin Tools, with its The Chef app, can alleviate this cognitive load that poses a challenge for students.

In general, the tools presented in this scenario enable students with ASD to:

- Reduce your cognitive load by externalizing thoughts, ideas, or notes to external devices.
- Be clear about the routines that take place in their daily life.
- Improve consistency in their habits.
- Focus their attention by blocking out distractions or by motivating them to achieve goals or complete trackers.
- Organize tasks.
- Manage time.
- Increase the understanding of messages and the transmission of emotions.
- Reduce uncertainty and anxiety.

Teacher's Role and Pedagogical models suggested to use

University teachers must understand needs and challenges of students with ASD to support their academic and personal development in higher education. Regarding perceptions that facilitated academic success and challenges, Madaus et al. (2022) analyzed the experiences of 40 university students with ASD enrolled in highly competitive universities in the US. Among their findings, they discovered that the personal trait that most contributed to their success was their passion for learning. On the other hand, the greatest difficulty they encountered in

their learning was some teaching practices of the faculty. In this regard, Florian & Spratt (2013) point out that some teachers do not feel prepared to support students with ASD. In response to this situation, training and models are needed that clearly define the role of teachers and the support they require to meet the needs of students with ASD.

In connection with this need, Van Hees et al. (2015) outlined several recommendations for supporting higher education students with ASD. (1) A personalized approach that considers their preferences and needs. (2) Sufficient planning and clear communication that promotes a safe environment. (3) Academic accommodations such as more time for exams or alternative assignments instead of group work. (4) Coaching for university life and daily routines. (5) Psychosocial support. (6) Rest and leisure activities to manage stress and anxiety.

In addition, Fidosieva (2025) redefines the concept of support for students with ASD through the proposal of SPARK model, an integrated pedagogical process that includes six elements:

- *Supportive environment*: an adaptable and flexible environment based on the characteristics of the students. This includes both the organization of the physical space and the materials and resources, ensuring they are predictable, accessible, and supportive of their learning. A structured environment reduces anxiety, facilitates active engagement, and supports self-regulation (Fidosieva, 2025).
- *Partnership/accompaniment*: Teaching staff is a facilitator who accompanies and creates a stable communication and development framework for students with ASD.
- *Autonomy*: its development is fundamental to promoting confidence and independence.
- *Results*: For the holistic development of students, it is essential to achieve not only academic but also social objectives.
- *Communication*: involves the expression of ideas and emotions through different means (verbal, visual, or technological).

In line with these pedagogical guidelines indicated by Van Hees (2015) and Fidosieva (2025), we consider that the AI-based tools provided in the four scenarios dedicated to higher education students with ASD can contribute to their personal, academic and social development.

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