

INEDU

AI-BASED TRAINING
PROGRAM FOR TEACHERS

HANDBOOK

FOR TEACHERS



inedu



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INEDU AI-based training program for teachers on inclusive education

HANDBOOK FOR TEACHERS

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Introduction to INEDU Training Programme

The *INEDU AI-based training programme for teachers on inclusive education* aims to improve the skills of higher education staff in the use of AI-based tools to support students with disabilities.

Specific objectives of the INEDU training programme:

- To develop a comprehensive training programme based on artificial intelligence on inclusive education for teaching staff at higher education institutions.
- To improve teaching staff's skills in inclusive education through a specialised training programme.
- To develop a set of cutting-edge tools for teaching staff in the field of inclusive education, with an emphasis on the use of AI.

It has been developed around three key elements. Firstly, the identification of the needs of higher education teaching staff in relation to supporting students with disabilities and the use of AI-based tools, as outlined in the INEDU Compendium. The perspectives of both teachers (evaluation questionnaire) and technical staff from guidance services (qualitative interviews) have been considered. Furthermore, the design of the proposal includes a practical review of the scenarios developed in the document *Inclusive AI-based Education Scenarios*. Finally, the perspective of people with disabilities has been taken into account with the collaboration of the organisation *Polish Association Of Disabled People (PADP)*, whom we thank for reviewing these materials.

The material is organised into five main sections:

- Introductory Module: AI tools supporting students' disabilities in higher education.
- Module 1. AI tools supporting students with motor disabilities.
- Module 2. AI tools supporting students with sensory disabilities.
- Module 3. AI tools supporting students with mental health disabilities.
- Module 4. AI tools supporting students on the autism spectrum.

For a full understanding of the training programme, please check the document *INEDU Trainers Guide: AI-based training program framework & methodology*.

Introductory Module. AI TOOLS SUPPORTING STUDENTS' DISABILITIES IN HIGHER EDUCATION

Duration 1 hour

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Topic 1. INEDU project and this training

INEDU project (AI - Based Inclusive Higher Education, Erasmus +2024-1-PL01-KA220-HED-000256427) is a two-year Erasmus+ initiative co-funded by the European Union involving a strategic partnership between four universities in Poland (Pontifical University of John Paul), Lithuania (Kaunas University of Technology), Germany (University of Bayreuth), and Spain (Florida Universitària). The main objective of this project is to improve inclusive higher education by providing specialised support to students with disabilities through the integration of artificial intelligence-based tools. This project specifically addresses sensory disabilities, motor disabilities, mental illnesses, and autism spectrum disorders.

The objectives proposed by the INEDU project are:

- To expand the knowledge of academic staff, administrative staff, and higher education students on how to create an inclusive academic environment.
- To strengthen the skills of teaching staff in inclusive education using artificial intelligence-based technologies.
- To improve accessibility for students with disabilities and special educational needs in higher education institutions.

INEDU training program is part of the main outcomes of the project and is complemented by two other outcomes: *Compendium on inclusive education* and *Scenarios on inclusive education based on AI technologies*. During this training, references will be made to both materials as theoretical input on the disabilities addressed (Compendium) and as a repository of further information on AI-based tools (Scenarios).

INEDU training program General Objective

To strengthen the capacity of higher education teaching staff to design, implement and evaluate inclusive, accessible and ethically responsible teaching and assessment practices through the informed use of Artificial Intelligence, addressing the needs of students with physical, sensory, cognitive and mental disabilities, as well as Autism Spectrum Conditions, in order to promote equity, participation and success in higher education.

SPECIFIC OBJECTIVES

- To develop a **conceptual and pedagogical understanding of inclusion, disability, and neurodiversity in higher education.**
- **To enhance higher education teaching staff's knowledge of Artificial Intelligence** and its educational applications, with particular attention to generative, adaptive and assistive AI tools relevant to inclusive teaching and learning contexts.
- **To promote the ethical, transparent and responsible use of Artificial Intelligence in higher education,** ensuring compliance with European principles related to fairness, accessibility, data protection, and the prevention of algorithmic bias, especially in relation to students with disabilities.
- **To strengthen teaching staff's capacity to design inclusive learning environments based on Universal Design for Learning (UDL) principles,** supported by Artificial Intelligence, to offer multiple means of representation, engagement and expression.
- **To equip teaching staff with practical strategies for using Artificial Intelligence to support accessibility for students with sensory and physical disabilities,** including the adaptation of digital learning materials, communication channels and learning platforms.
- **To support teaching staff in addressing cognitive diversity, mental health needs and Autism Spectrum Conditions in higher education,** through the informed use of Artificial Intelligence to enhance organization, comprehension, self-regulation and learner autonomy, while avoiding over-assistance and dependency.
- **To improve teaching staff's competence in designing inclusive, flexible and fair assessment and feedback practices,** using Artificial Intelligence to enhance formative assessment and personalized feedback without reinforcing exclusion or bias.
- **To foster reflective and critical teaching practices regarding the impact of Artificial Intelligence on student learning, wellbeing and participation,** encouraging evidence-informed decision-making and continuous professional development.
- **To facilitate the transfer of training outcomes to real teaching contexts,** enabling participants to design, implement and evaluate an inclusive teaching activity or course supported by Artificial Intelligence within their own higher education institution.



- **To contribute to institutional capacity building and sustainability in including digital education**, by promoting scalable, transferable and replicable training practices aligned with European frameworks and policies.

Topic 2. EU values and inclusive education

Duration 1 hour

Inclusive education has its origins in the Convention on the Rights of the Child (United Nations, 1989), which establishes education as a fundamental human right. Subsequent international treaties have further developed this right. For example, the Convention on the Rights of Persons with Disabilities (United Nations, 2006) requires signatory states to guarantee inclusive education, establishing the reasonable adjustments and specific supports necessary to make it a reality.

Therefore, inclusive education is linked to equity in the education system, affects all types of students and requires profound and systemic transformations, as emphasised in the Incheon Declaration (UNESCO, 2015). Achieving educational inclusion is a key commitment of the European Union, aligned with the Sustainable Development Goals (United Nations, 2026), particularly goals 4 (Quality Education) and 5 (Gender Equality). In this framework, the promotion of equity, social cohesion, and active citizenship constitutes a set of strategic objectives defined by the EU in the field of education.

This commitment is also reflected in the European Pillar of Social Rights (European Commission, 2017), where the very first principle establishes that: “Everyone has the right to quality and inclusive education, training and life-long learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market” (p. 11).

Figure 1.

European Pillar of Social Rights – 20 principles



Infographic on the 20 principles of the European Pillar of Social Rights. Reprinted from European Pillar of Social Rights – 20 principles, by European Commission (s.f.), European Commission Website. <https://employment-social-affairs.ec.europa.eu/policies-and-activities/european-pillar-social-rights->

[building-fairer-and-more-inclusive-european-union/european-pillar-social-rights-20-principles_en](#).
Copyright: European Commission.

This commitment to inclusive education is in line with the values shared by the member states of the European Union. These include respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities. All these values form part of the founding charter of the European Union and are also enshrined in Article 2 of the Treaty of Lisbon (European Union, 2007).

Therefore, ensuring inclusive quality education is key to achieving and consolidating a cohesive European society, in which everyone in a Member State can develop a sense of belonging at both local and European level, as set out in the Council Recommendation on Common Values, Inclusive Education, and the European Dimension of Teaching (2018). “Inclusive and high quality education and training, at all levels, as well as the European dimension of teaching, are paramount for creating and maintaining a cohesive European society” (European Education Area, 2023).

Accordingly, the Recommendation aims to strengthen social cohesion and to counteract xenophobia, radicalisation, divisive nationalism, and the spread of fake news. To achieve this, it places emphasis on fostering common values at all stages of education, promoting more inclusive educational environments, integrating a European dimension into teaching, and providing support for teachers and educational institutions. All these actions are fully aligned with the implementation of the European Pillar of Social Rights. Instruments such as the Erasmus+ programme and the European Structural and Investment Funds play a key role in supporting the development and effective application of this Recommendation.

The 2015 joint report by the European Commission and the European Council on the implementation of the strategic framework¹ in the field of education and training (ET 2020) has established, among others, the following priority areas: a) inclusive education, equality, equity, non-discrimination and the promotion of civic competences, and b) providing strong support for teachers, trainers, school leaders and other educational staff. They therefore emphasise the need to take effective action to promote diversity in all its forms and to facilitate inclusive education and training for all, removing barriers that limit the full participation of students, focusing on the most vulnerable groups and identifying among them those with special needs.

Furthermore, the Global Education Monitoring Report (UNESCO, 2020) explicitly emphasises that inclusive education should be understood as an aspiration for ‘everyone, without exception’. In this regard, people in situations of greater vulnerability

¹ The strategic framework of the European Education Area encourages collaboration between European Union Member States and key stakeholders and enables progress towards achieving its collective vision to be monitored.

must be given priority in action plans, as they face a greater number of barriers that hinder their full participation.

In this way, inclusive education is conceived as 'a process that contributes to overcoming the obstacles that limit the presence, participation and achievements of students, while strengthening the capacity of the education system' (Ministerio de Educación, Formación Profesional y Deportes, n.d.). From this perspective, moving towards real inclusion requires profound changes in the cultures, policies and practices of educational institutions, as outlined in the Index for Inclusion (Booth & Ainscow, 2002).

Self-assessment questions for Introductory Module Topic 2

1. In which international treaty is education first established as a fundamental human right?

- a) Convention on the Rights of Persons with Disabilities (2006)
- b) Incheon Declaration (2015)
- c) Convention on the Rights of the Child (1989)
- d) Treaty of Lisbon (2007)

Correct answer: c)

2. According to the Convention on the Rights of Persons with Disabilities (2006), States Parties must...

- a) Create separate educational centres for students with disabilities
- b) Guarantee inclusive education through reasonable accommodations and specific supports
- c) Prioritise gender equality as the main educational goal
- d) Establish segregated educational pathways based on personal characteristics

Correct answer: b)

3. Which European document states, as its first principle, that everyone has the right to quality and inclusive education and training?

- a) ET 2020 Strategic Framework
- b) Council Recommendation on Common Values (2018)
- c) European Pillar of Social Rights (2017)
- d) Sustainable Development Goals (2026)

Correct answer: c)



4. What is one of the main objectives of the Council Recommendation on Common Values, Inclusive Education and the European Dimension of Teaching (2018)?

- a) Reduce student mobility within the European Union
- b) Counteract xenophobia, radicalisation, and the spread of fake news
- c) Promote educational centres grouped by levels of ability
- d) Eliminate the Erasmus+ programme

Correct answer: b)

5. According to the Index for Inclusion (Booth & Ainscow, 2002), moving towards inclusive education requires...

- a) Introducing only new technologies into the classroom
- b) Deep transformations in the cultures, policies and practices of educational institutions
- c) Focusing exclusively on academic performance
- d) Creating homogeneous learning groups

Correct answer: b)

Topic 3. European and educational framework for ethical AI

(Duration 1 hour)

The ethics of artificial intelligence addresses the development and use of AI, analyzing its impact on people's lives and societies. The European Commission (2019), in its document "*Ethical Guidelines for Trustworthy AI*" (Independent High-Level Expert Group on Artificial Intelligence Set Up by the European Commission) proposes the framework of "trustworthy AI," which requires that every system be simultaneously lawful, ethical, and robust. In other words, AI must comply with the existing legal framework, respect moral norms that ensure respect for human dignity and fundamental rights and be robust from both a technical perspective (safe, reliable systems that are not vulnerable to attacks) and a social perspective (that it does not cause accidental harm).

Based on the fundamental rights included in the Charter of Fundamental Rights and the Treaties of the European Union, the Independent High-Level Expert Group on Artificial Intelligence Set Up by the European Commission (2019) highlighted four ethical principles that AI-based systems must meet to be reliably developed, deployed, and used:

- **Respect for human autonomy.** Humans must maintain full control over AI systems. Technology must not be used to manipulate, deceive, or unfairly condition people.
- **Prevention of harm.** Systems must not cause or exacerbate harm to human beings, protecting their physical and mental integrity. Emphasis is placed on the importance of paying attention to people in vulnerable situations.
- **Equity.** Analyzed from two perspectives. The first is substantive equity, which means that individuals and groups should not suffer unfair bias, discrimination, or stigmatization. It entails promoting equal opportunities in terms of access to education, goods, services, and technology. On the other hand, procedural equity maintains that those who manage AI should have the ability to challenge decisions made by AI-based systems.
- **Explainability.** This principle states that it is essential to guarantee the transparency of AI systems, communicating their operation, purpose and capabilities to generate trust in users.

In the university setting, recent literature underscores that AI can improve accessibility, personalized learning, and participation for students with disabilities, but warns of ethical risks if implemented without critical reflection (Pierrès et al., 2024). Reviews of AI in higher education with students with disabilities highlight both its transformative potential (e.g., intelligent assistive technologies, accessible learning analytics) and the danger of reproducing inequalities, biases, and invisible barriers (Roy & Johnson, 2025).

On the other hand, AI can act as a social mirror, exposing systemic biases against people with disabilities (Hadar et al., 2025). Among the specific ethical risks that students, and especially students with disabilities, may face are:

- **Algorithmic bias and discrimination.** Disabilities are diverse and can be unique; algorithms tend to treat these students as outliers, which can lead to misclassifications or exclusions (Pierres et al., 2023). Labeling students as “at-risk” can lead to teachers having low expectations of students with disabilities if the system systematically classifies them as prone to failure (Riazy et al., 2020).
- **Privacy and data security.** AI-based systems can infer the existence of a disability from behavioral or interaction patterns, which can lead to non-consensual health disclosure (Morris, 2020). Additionally, there is also the risk of continuous surveillance through the use of proctoring tools, facial recognition, or biometric data without a clear ethical framework (Nigam et al., 2021).
- **Lack of transparency and explainability.** Many AI-based systems do not allow understanding of how a decision was made (Dumitru et al., 2025).
- **Impact on mental health.** There is a debate about the use of chatbots not supervised by mental health professionals and the consequences it may have in relation to the lack of human contact and social isolation (Rahsepar et al., 2025).
- **Digital divide and inequality.** There is a disparity in access to AI-based systems. Regarding AI-driven digital accessibility for people with disabilities, Chemnad & Othman (2024) noted that there is predominant access for visual impairments, revealing a critical gap in attention to speech and hearing impairments, autism spectrum disorder, neurological disorders, and motor disabilities.

The ethical design of AI must be based on fairness, transparency, and inclusion. It is essential to avoid biases that particularly harm students with disabilities and to guarantee accessibility. To this end, the tools must undergo rigorous evaluations and comply with ethical principles, incorporating clear and explainable decision-making processes that generate trust (Dumitru et al., 2026). In fact, the European Union Artificial Intelligence Act (Regulation (EU) 2024/1689) highlights the importance of deploying AI in education to acquire digital skills training and warns that people with disabilities may be excluded if assessment systems that use AI are not designed or used correctly.

When improperly designed and used, such systems may be particularly intrusive and may violate the right to education and training as well as the right not to be discriminated against and perpetuate historical patterns of discrimination, for example against women, age groups, persons with certain disabilities, or persons of certain racial or ethnic origins or sexual orientation. (European Union, Regulation (EU) 2024/1689)

Recommendations include adopting a social model of disability, involving students in the design and evaluation of tools, and ensuring specific governance frameworks and teacher training on AI ethics (Pierrès et al., 2024). Integrating AI into higher education goes beyond technical preparation. It requires ethical preparation that includes data governance protocols, AI literacy for faculty and students, the creation of ethics review boards, audits to detect algorithmic bias, and fostering a culture of responsibility where technological innovation does not compromise social justice or fundamental rights (Peddi & Manoharan, 2026).

Self-assessment questions for Introductory Module Topic 3

1. According to the European Commission, what are the three requirements for "trustworthy AI"?

- a) Fast, digital, and modern.
- b) Lawful, ethical, and robust.
- c) Secret, private, and expensive.
- d) Simple, manual, and automatic.

Correct answer: b)

2. What does the principle of "Respect for human autonomy" mean in the text?

- a) Humans must maintain full control over AI systems.
- b) AI should make all the decisions for people.
- c) Technology can be used to manipulate or deceive users.
- d) AI systems do not need any human supervision.

Correct answer: a)

3. Why can algorithmic bias be a serious risk for students with disabilities?

- a) Because AI tools are usually too expensive for universities.
- b) Because students with disabilities do not like using technology.
- c) Because algorithms often treat these students as "outliers," leading to exclusion.
- d) Because AI is only designed for teachers, not for students.

Correct answer: c)

4. Regarding privacy, what is a specific danger mentioned in the sources?

- a) AI systems automatically delete all student information.
- b) Students are forced to share their passwords with the AI.
- c) AI can infer a person's disability from their behavior without consent.
- d) AI makes all health records public for everyone to see.

Correct answer: c)



5. What is "substantive equity" in the context of inclusive AI?

- a) Ensuring that all students use the exact same computer model.
- b) Ensuring that individuals do not suffer unfair bias or discrimination.
- c) Making sure that AI systems are always very fast.
- d) Allowing only AI experts to make decisions in the university.

Correct answer: b)

Topic 4. Universal Design for Learning (UDL)

Planning teaching and learning in accordance with Universal Design for Learning (UDL) (CAST², 2008, 2024) aims to address and respond to the diverse needs of pupils in the classroom, of any age and educational level, and thus ensure equal opportunities in access to learning, that is, to the objectives, competences and content of standard curricula. It is a support system that promotes the removal of physical, sensory, emotional, and cognitive barriers to learning and student participation (Villaescusa, 2022). These are, therefore, inclusive programmes.

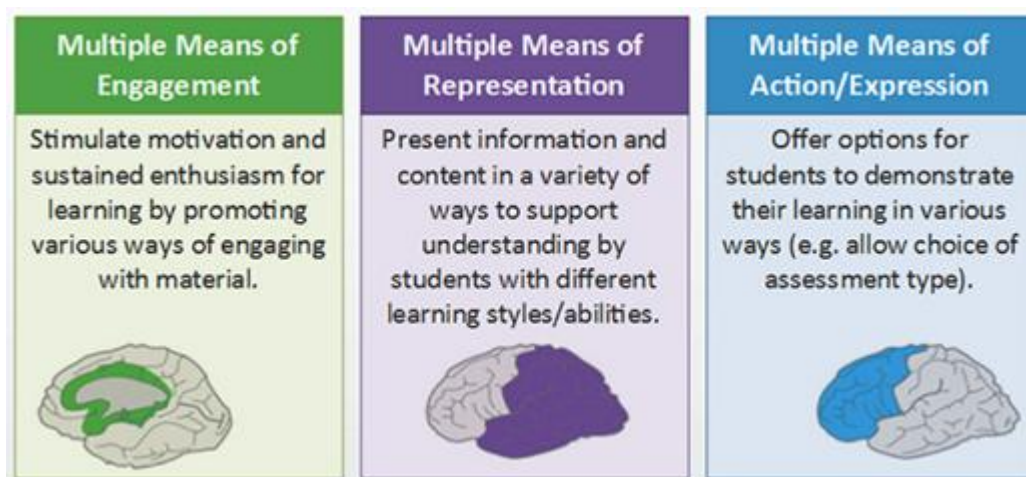
The UDL is grounded in neuroscience, which studies the brain's structure and functioning to understand how it operates both globally and locally. Research indicates that the brain has a modular organisation, comprising several specialised zones or modules that interact with one another.

This research highlights the neurological diversity that exists between individuals and diversity in learning (Alba et al., 2014). Therefore, no two brains are identical, and no two learners are the same.

Research carried out by CAST (2008), based on neuroscience studies, establishes that there are three areas specialised in specific tasks of information processing or execution, which play a key role in the learning process. The functioning of each of these subnetworks differs from person to person. Thus, there are differences between students in terms of recognising and processing information, carrying out a task and the way they engage with their own learning, as shown in Figure 2.

Figure 2.

Three areas of the brain specialised in learning



Note. CAST, 2008

The identification of these three brain networks, together with evidence of differences between individuals in how they function, forms the basis of the UDL framework. Thus, the UDL sets out

² The Center for Applied Special Technology (CAST) is a non-profit research and development organisation that works to expand learning opportunities for everyone through Universal Design for Learning.

a principle for each of the three sub-areas of specialised neural networks, and nine pedagogical guidelines for curriculum design (CAST, 2008).

Alba (2014) explains that the UDL is based on three principles:

Principle I. Provide multiple means of representation, as learners differ in the way they perceive and understand the information presented to them (the ‘what’ of learning). Therefore, we must offer diverse options for addressing content through different channels of perception (auditory, visual, kinesthetic) and, furthermore, we must use the formats for presenting information that are most suitable for the students. Some specific current methodological approaches include the Flipped Classroom Model, Augmented Reality, and Visual Thinking (Elizondo, 2017).

Principle II. Provide multiple means for action and expression (the ‘how’ of learning). Learners differ in the way they approach learning and express what they know. Therefore, it is necessary to offer varied options for action (through materials with which all students can interact), to facilitate options for expression and fluency (by providing support for the use of software and various material resources), and to provide opportunities for executive functions (by encouraging effort and motivation towards a goal). Elizondo (2017) refers to current pedagogical approaches linked to this third principle, such as: Mobile Learning, Thinking-based Learning, and Computational Thinking.

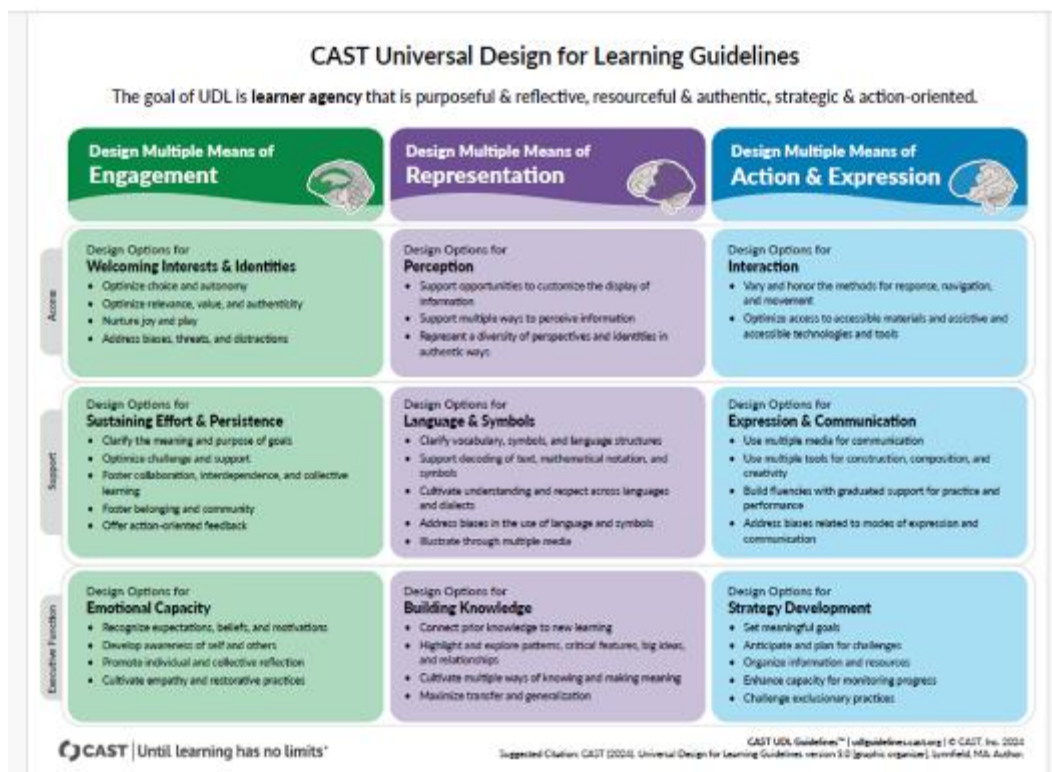
Principle III. Provide multiple avenues for engagement and ways of getting involved in the proposed activities (the ‘why’ of learning). Students differ in the ways in which they can feel engaged and motivated to learn. Therefore, a wide range of options must be offered that reflect students’ interests, strategies for tackling new tasks, opportunities for self-assessment and reflection on their expectations, etc. This refers to both external and internal motivation. Examples of current motivational teaching approaches include gamification and escape rooms (Elizondo, 2017).

Applying the principles of the UDL to the classroom translates into guidelines or a set of strategies that can be used in teaching practice to ensure that curricula are accessible to all students and to remove the barriers created by most of them. Each of the guidelines is linked to one of the UDL principles, which, in addition to justifying their relevance to learning, provide suggestions on how to put the corresponding principle into practice.

Figure 3 summarises how to incorporate each principle into teaching processes through guidelines (CAST, 2024).

Figure 3.

Principles of UDL and teaching guidelines



Note. CAST (2024). Universal Design for Learning Guidelines, Version 3.0 [mind map]. Lynnfield, MA: Author

It follows from this that, in order to cater for diversity, we must move away from the traditional school model in which all children work on the same tasks in the same way at the same time, as Blanco (2009) points out.

In this regard, a flexible curriculum involves adopting an active, inclusive classroom methodology that varies according to pupils' abilities, interests and attitudes. It is also necessary to consider different ways of grouping pupils (individually, in small or large groups) to enable the implementation of these varied methodologies (tutorial, collaborative or cooperative teaching), as well as making groups and timetables more flexible.

Thus, the study conducted by Arnaiz et al. (2018) on an educational innovation initiative—in which a teaching unit was designed, implemented and evaluated in accordance with DUA guidelines using standard measures for addressing diversity—demonstrates that the teaching-learning process was enriched and that the initiative was well received by both students and teachers.

Self-assessment questions for Introductory Module Topic 4

1. What is the main purpose of planning teaching and learning according to Universal Design for Learning (UDL)?

- a) To create separate programmes for students with special needs
- b) To ensure equal access to learning by addressing diverse student needs
- c) To standardise teaching methods across all classrooms
- d) To increase the use of digital technologies

Correct answer: b)

2. Which statement best reflects the neuroscience basis of UDL?

- a) All learners process information in the same way
- b) The brain is structured in identical modules across individuals
- c) Neurological diversity means no two brains or learners function in the same way
- d) Neuroscience shows there is only one optimal learning pathway

Correct answer: c)

3. According to CAST (2008), which of the following is not one of the three specialised neural networks central to UDL?

- a) Recognition networks ("what" of learning)
- b) Affective networks ("why" of learning)
- c) Strategic networks ("how" of learning)
- d) Memory consolidation networks ("when" of learning)

Correct answer: d)

4. Which pedagogical approaches are examples of providing multiple means of representation (Principle I of UDL)?

- a) Mobile Learning, Computational Thinking
- b) Gamification, Escape Rooms
- c) Flipped Classroom, Augmented Reality, Visual Thinking
- d) Cooperative Learning, Debate-based Learning

Correct answer: c)

5. What does implement a flexible curriculum, according to UDL, primarily require?

- a) Keeping all students working on the same tasks at the same time
- b) Adopting active, inclusive methodologies adapted to student abilities and interests
- c) Eliminating group work to ensure individual accountability
- d) Organising students strictly by ability levels

Correct answer: b)

Topic 5. Self-assessment questionnaires as a starting point for training

Author: Bożena Majerek

In this Introductory Module, we have included two tools designed to facilitate teachers' self-assessment and critical reflection on their teaching practices. Within the INEDU Handbook, these questionnaires are presented as an initial diagnostic tool, intended to help teachers identify their starting point before beginning the training. Their function is not evaluative or for accreditation purposes, but rather formative, as they facilitate awareness of one's own teaching practices and guide the design of improvement pathways related to inclusive education, UDL and the responsible integration of Artificial Intelligence in higher education.

The Academic Teacher Self-Assessment Sheet in the UDL Model with the Use of AI is a self-assessment tool designed to help university lecturers reflect on their teaching practices from the perspective of Universal Design for Learning (UDL) and the conscious, inclusive and ethical use of Artificial Intelligence (AI).

The Academic Teacher Self-Assessment Sheet in Working with Students with Disabilities is a self-assessment tool designed to help university lecturers analyse and improve their teaching practices in relation to the inclusion of students with motor, sensory, mental disabilities, as well as those on the autism spectrum. The questionnaire allows for an assessment of the extent to which teaching meets the specific needs of students and promotes their full participation in higher education. As part of the INEDU Handbook, this tool helps teachers identify areas for professional development and set improvement goals aimed at more equitable, accessible and inclusive teaching.

5.1. ACADEMIC TEACHER SELF-ASSESSMENT SHEET IN THE UDL MODEL WITH THE USE OF AI

The purpose of this training material is to support academic teachers in reflecting on their own teaching practice in the context of Universal Design for Learning (UDL) and the conscious and ethical use of AI, especially when working with students with disabilities.

Self-assessment scale:

- 1 – no (the activity is not carried out)
- 2 – partially (the activity is carried out irregularly or non-systematically)
- 3 – yes (the action is implemented consciously and systematically)

1. I. STUDENT ENGAGEMENT

Statement	1	2	3	Comment
I clearly communicate learning objectives and outcomes.				
I explain the meaning and application of the content.				
I ensure a predictable structure for the lessons.				
I allow for a choice of activities or topics.				
I create a safe and supportive atmosphere.				
I allow AI in the learning process.				
I set clear rules for the ethical use of AI.				

2. CONTENT PRESENTATION

Statement	1	2	3	Comment
I share materials in digital form.				
I present content in more than one form.				
The materials are legible.				
I explain key and difficult concepts.				
I use summaries, diagrams, and concept maps.				
I allow AI to summarize and simplify content.				
AI supports translation and conversion (text↔audio).				

3. ACTION AND EXPRESSION

Statement	1	2	3	Comment
Students can demonstrate their knowledge in various ways.				
The assessment criteria are clear and known in advance.				
I provide instructions and examples of how to complete the tasks.				
I use feedback to support learning.				
I allow AI to be used as a support for planning and structuring work.				
Assessment focuses on outcomes.				
I require transparent disclosure of AI use.				

IV. ACCESSIBILITY AND DIVERSITY

Statement	1	2	3	Comment
I design my classes with student diversity in mind.				
The adjustments are systematic, not random.				
I do not change the substantive requirements.				
I ensure flexibility in the forms of implementation and assessment.				
AI supports accessibility (e.g., subtitles, TTS, STT).				
I protect student privacy and data.				

V. ETHICS AND RESPONSIBLE USE OF AI

Statement	1	2	3	Comment
The rules for using AI are clearly communicated.				
AI does not replace the student's key competencies.				
I require critical reflection on AI results.				
AI serves to level the playing field, not to lower requirements.				
I regularly update the rules for using AI.				

VI. REFLECTION AND IMPROVEMENT

Statement	1	2	3	Comment
I analyze feedback from students.				
I modify classes based on evaluations.				
I develop UDL competencies.				
I develop AI competencies.				
I document good teaching practices.				

5.2. ACADEMIC TEACHER SELF-ASSESSMENT SHEET IN WORKING WITH STUDENTS WITH DISABILITIES

The purpose of this training material is to support academic teachers in reflecting on their own teaching practice in the context of Universal Design for Learning (UDL) and the conscious and ethical use of AI, especially when working with students with disabilities.

Self-assessment scale:

- 1 – no (the activity is not carried out)
- 2 – partially (the action is implemented irregularly or non-systematically)
- 3 – yes (the action is implemented consciously and systematically)

MOTOR DISABILITY

Statement	1	2	3	Comment
I design classes without physical barriers and unreasonable manual requirements.				
I enable alternative forms of task completion and assessment.				
I allow remote or asynchronous forms of learning.				
I ensure flexibility in working hours, if justified.				
AI supports dictation, formatting, and organization of student work.				

SENSORY DISABILITY

Statement	1	2	3	Comment
Teaching materials are available digitally.				
Content is not delivered in a single format.				
Recordings have captions or transcripts.				
Graphics and charts have alternative descriptions.				
AI supports text ↔ audio conversion and content description generation.				

MENTAL DISABILITY

Statement	1	2	3	Comment
I ensure a predictable class structure and clear requirements.				
I divide tasks into stages and limit cognitive overload.				
I use supportive and non-judgmental communication.				
I allow for flexibility in deadlines when justified.				
AI supports planning, organization, and reduction of cognitive stress.				

AUTISM SPECTRUM DISORDER (ASD)

Statement	1	2	3	Comment
Instructions are clear, specific, and written down.				
I ensure a consistent and predictable structure for classes.				
I limit excessive stimuli and ambiguous messages.				
I accept alternatives to public speaking				
AI supports the analysis of instructions and the preparation of speeches.				

Module 1. AI TOOLS SUPPORTING STUDENTS WITH MOTOR DISABILITIES

Authors: Daina Gudoniene, Evelina Staneviciene,

Duration 20 hours

Introduction

The growing reliance on digital learning environments has highlighted significant accessibility gaps for students with motor disabilities, who often face barriers when interacting with standard input devices and interfaces. This module, “Chatbots Implementation and Integration Scenario: Supporting Students with Motor Disabilities,” addresses the need for inclusive technological solutions that reduce these barriers. Chatbots, powered by natural language processing, offer an alternative interaction method that can minimize physical effort while improving access to academic content and services. According to research on assistive technologies, conversational interfaces can enhance autonomy and engagement for users with limited mobility (W3C, 2018; OECD, 2021). This module therefore focuses on the practical and ethical implementation of chatbot systems tailored to diverse user needs, emphasizing inclusive design principles, usability, and integration into existing educational platforms to promote equal learning opportunities.

Aim:

Learning Outcomes. After completing the module learners will be able:

- to identify chatbots for educational purposes
- to apply different scenarios supporting students with motor disabilities

The module 1 consists of 3 topics and explores how conversational AI can enhance accessibility and inclusion in educational environments. It focuses on designing, developing, and integrating chatbot solutions that assist students who face physical challenges in interacting with traditional learning tools. By leveraging natural language interfaces, these systems enable easier communication, navigation of digital platforms, and access to academic resources. The module also examines user-centered design, ethical considerations, and practical deployment strategies, equipping learners with the skills to create adaptive, inclusive technologies that improve educational equity and student independence.

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

Aim of the topic is to explore how chatbot technologies can be effectively implemented and integrated to support students with motor disabilities in accessing and participating in educational activities. It also seeks to guide educators in using AI-based tools to create inclusive learning environments that enhance accessibility, independence, and student engagement.

1.1. Learning material (guidelines for teachers on how to use tool-based learning materials)

1.1.1. *Google Assistant / Apple Siri / Amazon Alexa*

Integrating voice-based AI assistants such as Google Assistant, Apple Siri, and Amazon Alexa can significantly improve accessibility for students with motor disabilities by enabling hands-free interaction with learning materials.

These tools allow students to dictate text, search for information, control devices, and manage tasks using voice commands, reducing the need for physical input like typing or writing. Teachers should first familiarize themselves with these features and select those that best support their lesson goals.

Applying Universal Design for Learning (UDL) principles is essential. Voice assistants provide flexible ways for students to access content (e.g., listening to texts), engage in learning (e.g., voice-based research), and express knowledge (e.g., spoken answers instead of written ones). This benefits not only students with disabilities but all learners.

Teachers can begin with simple classroom activities, such as:

- Using speech-to-text for short answers
- Asking for definitions or translations
- Setting timers or reminders
- Navigating digital platforms with voice commands

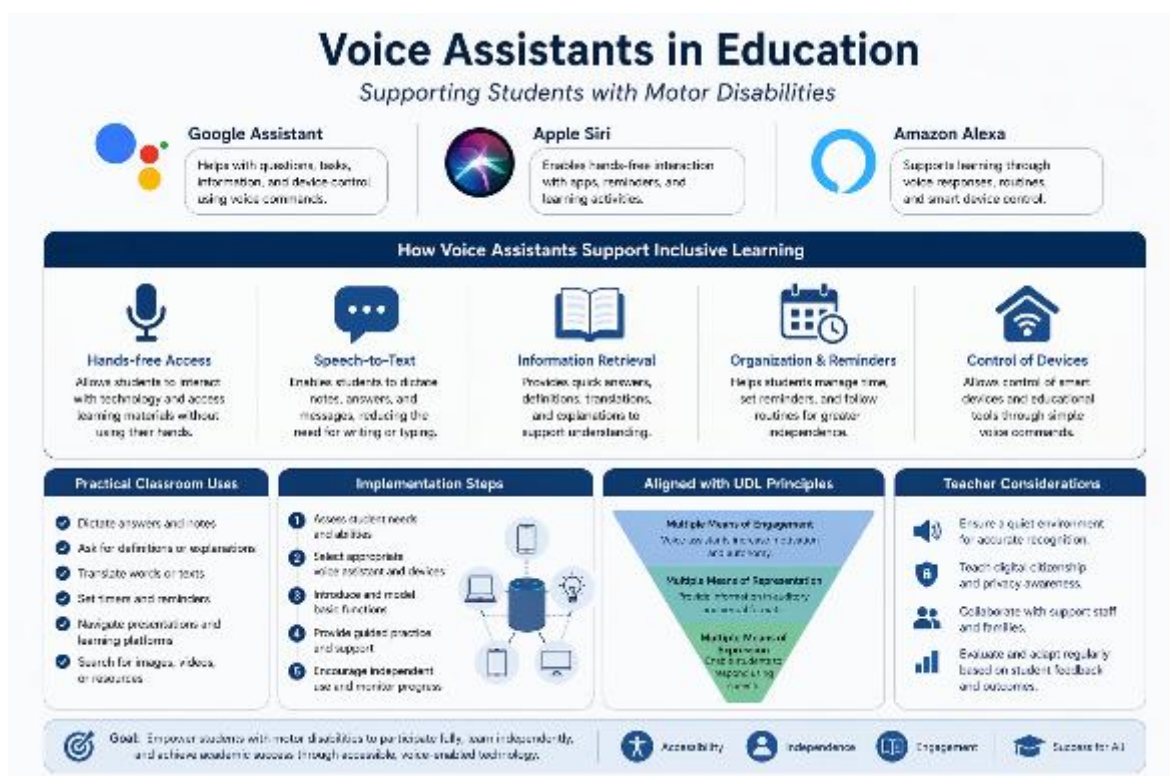


Fig. 1.1. Voice Assistants in Education (source: <https://chatgpt.com/>)

As confidence grows, more advanced uses can be introduced, including integration with educational platforms and multimedia tools.

Personalization is key. Teachers should assess individual student needs and adapt the use of AI assistants accordingly. Providing clear instructions, demonstrations, and guided practice helps students become independent users.

The classroom environment also matters. Minimizing background noise improves voice recognition, while establishing clear usage rules ensures effective and respectful use. Additionally, students should be introduced to basic digital literacy concepts, including privacy awareness and the limitations of AI tools.

Collaboration with support staff and families can enhance implementation and ensure consistent use across learning contexts. Regular evaluation and student feedback help teachers refine their approach.

Overall, voice assistants offer practical and inclusive solutions that support participation, independence, and engagement for students with motor disabilities.

1.1.2. Dragon Naturally Speaking

Dragon NaturallySpeaking is a speech-to-text tool that enables students with motor disabilities to convert spoken language into written text, reducing the need for typing or handwriting. It is particularly beneficial for learners who have difficulties using keyboards or other input devices, supporting more independent participation in educational activities.

Teachers should first become familiar with the key features of the tool, such as accurate dictation, voice commands for editing and navigation, and adaptive speech recognition that improves over time. These features allow students not only to write texts but also to control digital environments using their voice, increasing both accessibility and efficiency.

In line with Universal Design for Learning (UDL) principles, Dragon NaturallySpeaking provides alternative ways for students to express their knowledge. Instead of relying solely on written tasks, students can produce spoken responses that are automatically transcribed, making learning more inclusive and flexible for diverse needs.



Fig. 1.2. Dragon Naturally Speaking in Education (source: <https://chatgpt.com/>)

Practical implementation can begin with structured activities. Teachers can encourage students to:

- dictate short answers or classroom notes
- practice voice commands for punctuation and formatting
- brainstorm ideas aloud before writing tasks
- complete assignments using speech instead of typing

As students gain confidence, they can progress to more complex tasks such as writing longer essays, preparing reports, or navigating digital learning platforms independently.

Personalization is essential for successful integration. Teachers should assess individual student needs, including speech clarity and familiarity with technology. Initial training sessions help the system adapt to the student's voice, significantly improving recognition accuracy. Ongoing support, clear instructions, and modeling of use are important to build confidence and skills.

The learning environment also plays an important role. Minimizing background noise and using a quality headset with a microphone can improve performance. Establishing clear classroom routines ensures that the tool is used effectively without disrupting the learning process.

Additionally, teachers should promote digital literacy by encouraging students to review, edit, and critically evaluate the generated text. This helps ensure accuracy and strengthens learning outcomes.

Overall, Dragon NaturallySpeaking is a valuable tool for enhancing accessibility, independence, and active participation of students with motor disabilities, contributing to a more inclusive and supportive educational environment.

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

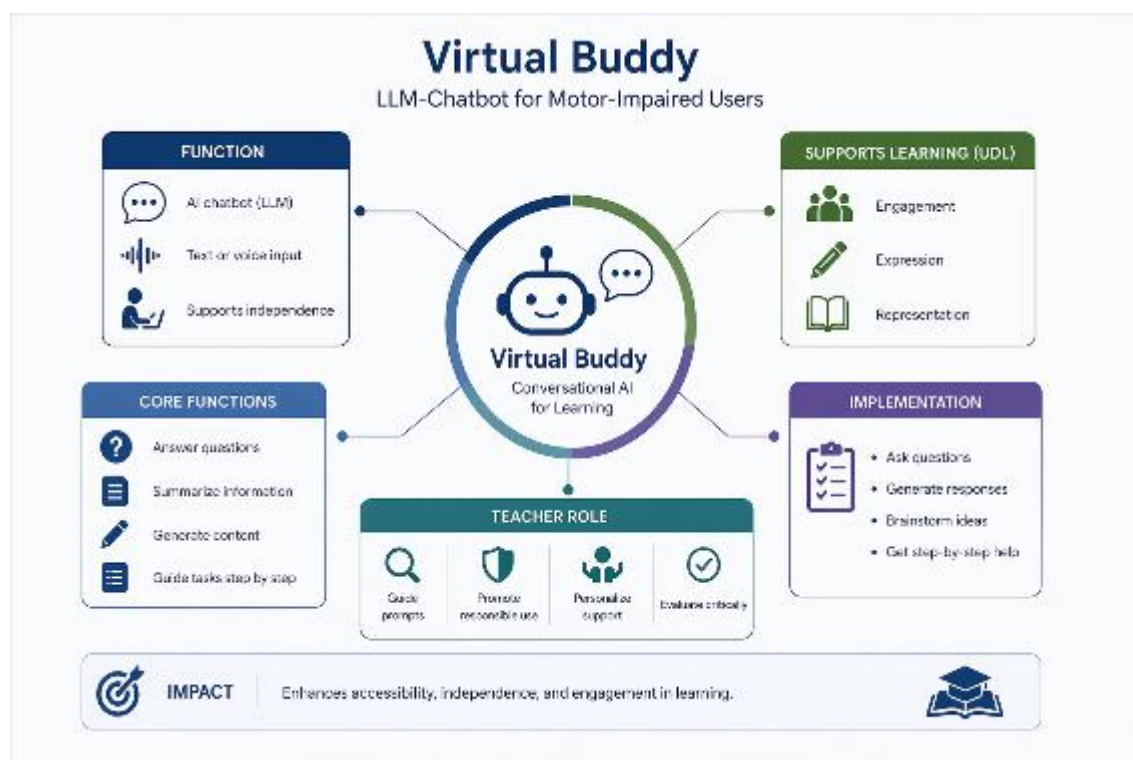


Fig. 1.3. Virtual Buddy (prototype LLM-chatbot for motor-impaired users) (source: <https://chatgpt.com/>)

Virtual Buddy is an AI-based chatbot designed to support students with motor disabilities through natural language interaction. It enables users to communicate, ask questions, and generate content with minimal physical effort, reducing the need for typing or manual input.

Teachers should understand its main functions, such as answering questions, summarizing information, generating text, and guiding students through tasks. These features help students participate more independently in learning activities.

In line with Universal Design for Learning (UDL), Virtual Buddy supports flexible engagement and expression. Students can interact through dialogue, receive immediate feedback, and express their ideas in alternative ways, promoting inclusion.

Practical implementation can begin with structured activities. Teachers can encourage students to:

- ask questions about lesson content
- generate short responses or summaries
- brainstorm ideas through conversation
- receive step-by-step task guidance

As students gain confidence, they can use the tool for more complex tasks such as writing assignments or organizing their learning.

Teachers should also support students in forming clear prompts and evaluating AI-generated responses, as the tool may produce inaccuracies. Promoting critical thinking and responsible use is essential.

Overall, Virtual Buddy enhances accessibility, independence, and engagement, supporting inclusive learning for students with motor disabilities.

1.1.4. ADMINS Chatbot (“Taylor”) – Open University

ADMINS Chatbot (Taylor) is an AI-powered chatbot developed by the Open University to assist students with academic and administrative queries. It provides instant, automated responses and guidance, helping students navigate learning processes more independently. For students with motor disabilities, such tools reduce the need for complex navigation or manual input by offering simple, conversational interaction.

Teachers should first understand the main functions of the chatbot. Taylor can answer frequently asked questions, provide course-related information, guide students through procedures, and offer timely support. This reduces barriers to accessing information and supports continuous learning outside the classroom.

In line with Universal Design for Learning (UDL), the chatbot enhances multiple means of engagement and support. Students can receive immediate feedback, clarify doubts, and access guidance at their own pace. This is particularly valuable for learners who may face physical challenges when interacting with traditional systems.

Practical implementation can begin with structured activities. Teachers can encourage students to:

- ask questions about course requirements or deadlines
- seek clarification on learning materials
- receive guidance on tasks or procedures
- use the chatbot for quick support during independent work

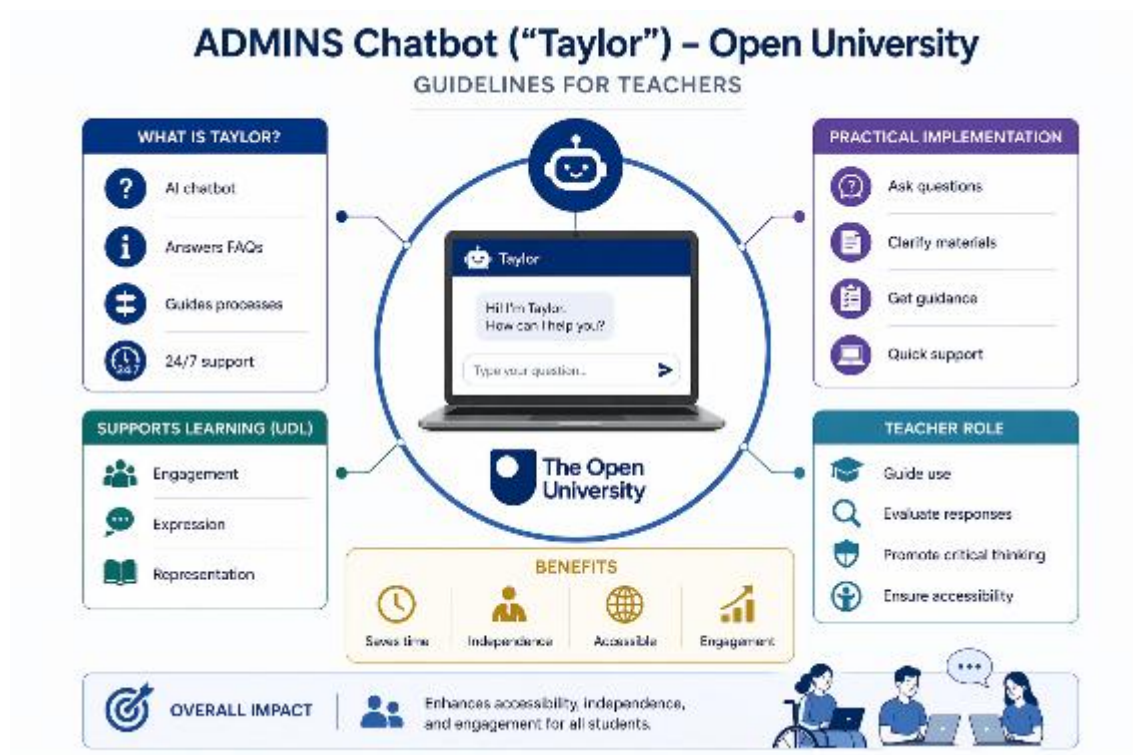


Fig. 1.4. ADMINS Chatbot ("Taylor") – Open University (source: <https://chatgpt.com/>)

As students become more confident, the chatbot can be used as a regular support tool for managing learning tasks and accessing information efficiently.

Teachers should also guide students in using the chatbot effectively, including how to ask clear questions and evaluate responses. Since chatbot answers may be limited or generalized, critical thinking and verification of information should be encouraged.

It is also important to consider accessibility and usability. Ensuring that the chatbot interface is easy to access and compatible with assistive technologies will enhance its effectiveness for students with motor impairments.

Overall, the ADMINS Chatbot ("Taylor") supports accessibility, independence, and engagement by providing responsive, user-friendly assistance, contributing to a more inclusive learning environment.

1.1.5. Progmagix Adaptive Chatbots

Progmagix Adaptive Chatbots are AI-driven tools designed to provide personalized, adaptive support for learners through conversational interaction. These chatbots can adjust responses based on user input, learning pace, and individual needs, making them particularly valuable for students with motor disabilities who benefit from simplified, accessible interaction.

Teachers should first understand the main capabilities of adaptive chatbots. Progmagix chatbots can deliver learning content, answer questions, guide students through tasks, and provide feedback in real time. Their adaptive nature allows them to tailor support, reducing cognitive and physical barriers to learning.

Aligned with Universal Design for Learning (UDL), these chatbots support multiple means of engagement and expression. Students can interact using simple text or voice input, receive immediate responses, and progress at their own pace. This flexibility promotes inclusion and supports diverse learning needs.

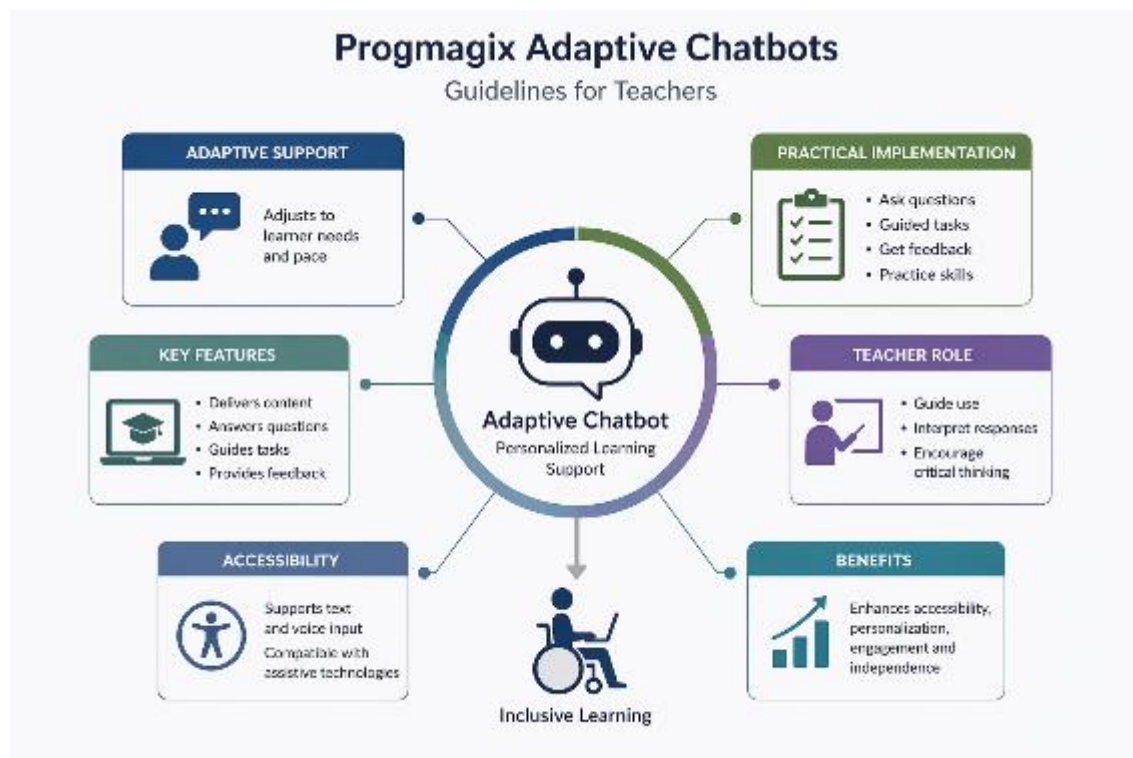


Fig. 1.5. Progmagix Adaptive Chatbots (source: <https://chatgpt.com/>)

Practical implementation can begin with structured activities. Teachers can encourage students to:

- ask questions related to lesson topics
- complete guided tasks through chatbot prompts
- receive personalized feedback on responses
- practice skills through interactive dialogue

As students become more confident, chatbots can be integrated into more complex learning activities, such as independent study, revision, or formative assessment.

Teachers play an important role in guiding effective use. They should support students in asking clear questions, interpreting responses, and reflecting on feedback. Since chatbot outputs may vary in accuracy, critical evaluation of information should be encouraged.

Accessibility considerations are essential. Ensuring compatibility with assistive technologies and enabling voice interaction can further support students with motor impairments. A structured and distraction-free environment can also improve the quality of interaction.

Overall, Progmagix Adaptive Chatbots enhance accessibility, personalization, and engagement, helping students with motor disabilities participate more actively and independently in the learning process.

In general, AI-based tools such as voice assistants, speech-to-text systems, and adaptive chatbots provide significant support for students with motor disabilities by enabling hands-free interaction and personalized learning experiences. These technologies enhance accessibility, independence, and engagement by reducing physical barriers and offering flexible ways to access and express knowledge. When effectively integrated by teachers, they contribute to more inclusive and equitable learning environments.

1.2. Self-assessment questions for Introductory Module Topic 1

- What are the main challenges students with motor disabilities face when using traditional digital learning tools?
- How can chatbot technologies improve accessibility in educational environments?
- What is the role of natural language processing in chatbot functionality?
- Why is user-centered design important when developing chatbots for students with disabilities?
- What ethical considerations should be taken into account when implementing assistive chatbot systems?
- How can chatbots be integrated into existing learning management systems?
- What are the key features that make a chatbot accessible and user-friendly for individuals with limited mobility?
- How can chatbot solutions support student independence and engagement?
- What are potential limitations or risks of using chatbots in inclusive education?
- How can the effectiveness of a chatbot for students with motor disabilities be evaluated?

Topic 2. Text-to-speech and speech-to-text technologies and implementation

Aim of the topic is to explore how text-to-speech and speech-to-text technologies can be implemented to support accessible communication, learning, and assessment for students with special educational needs. It also focuses on how AI-driven tools can assist in early diagnosis, continuous monitoring, and personalized interventions to enhance student outcomes and inclusive education.

2.1. Learning material (guidelines for teachers on how to use tool-based learning materials)

2.1.1. Deepgram

Deepgram is an AI-based tool for speech-to-text (STT) and text-to-speech (TTS) that can enhance accessibility and support diverse learners. It allows teachers to automatically transcribe lectures and convert text into audio, making learning materials more inclusive for students with hearing, visual, or reading difficulties.

Teachers can use Deepgram to generate transcripts of lessons, which students can review later as notes or summaries. Its text-to-speech function helps transform written content into audio, supporting flexible and self-paced learning.

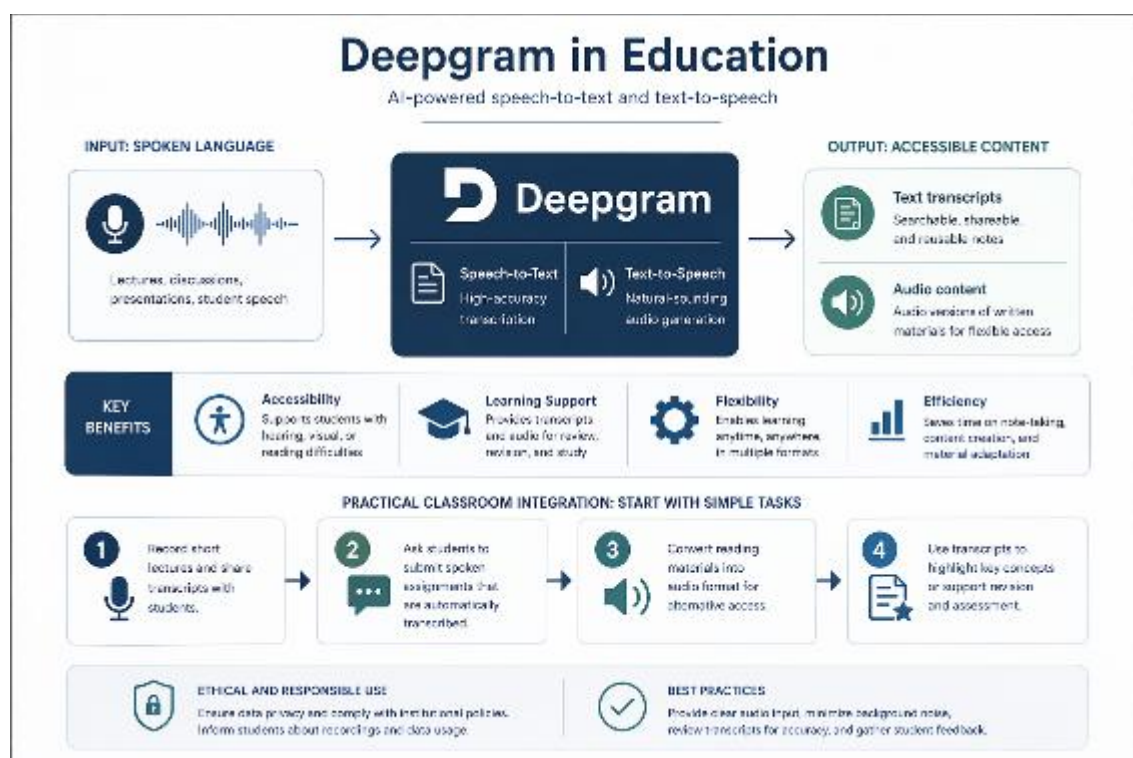


Fig. 2.1. Deepgram in Education (source: <https://chatgpt.com/>)

To ensure effective use, it is important to provide clear audio input, minimize background noise, and review transcripts for accuracy. Integrating Deepgram into learning platforms can help students easily access both audio and text materials in one place. Teachers should also consider data privacy and inform students about recordings.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- recording short lectures and sharing transcripts with students;
- asking students to submit spoken assignments that are automatically transcribed;
- converting reading materials into audio format for alternative access;
- using transcripts to highlight key concepts or support revision.

Gradual implementation and student feedback can help optimize the use of the tool.

In summary, Deepgram supports inclusive, flexible, and accessible learning by combining speech recognition and audio generation technologies in everyday teaching practice.

2.1.2. Otter.ai

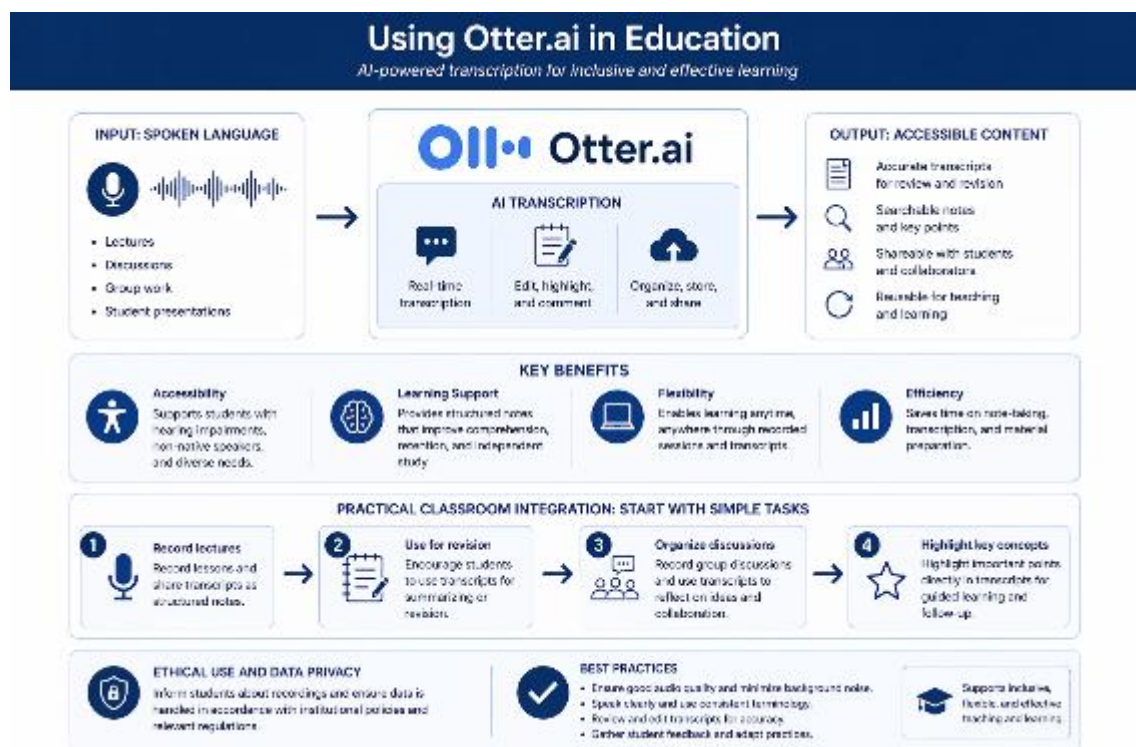


Fig. 2.2. Otter.ai in Education (source: <https://chatgpt.com/>)

Otter.ai is an AI-powered speech-to-text tool designed to record, transcribe, and organize spoken language in real time. In educational settings, it can significantly enhance accessibility, support student engagement, and improve the efficiency of teaching and learning processes.

Teachers can use Otter.ai to automatically transcribe lectures, discussions, and group work. These transcripts provide students with clear, structured notes that can be reviewed at any time,

which is especially beneficial for learners with hearing impairments, non-native speakers, or those who need additional time to process information. The tool also allows users to highlight key points, add comments, and organize content, making it useful for both teaching and collaborative learning.

One of the main advantages of Otter.ai is its real-time transcription capability. During lessons, students can follow along with live captions, improving comprehension and focus. Additionally, recorded sessions can be stored and shared, enabling students to revisit complex topics and reinforce their understanding. This supports flexible and inclusive learning environments, including hybrid or remote education contexts.

To use Otter.ai effectively, teachers should ensure good audio quality by minimizing background noise and speaking clearly. It is also recommended to review and edit transcripts, as automatic transcription may occasionally include errors, particularly with subject-specific terminology or different accents. Integrating Otter.ai into existing digital platforms, such as learning management systems, can further streamline access to recorded materials and transcripts.

Ethical use and data privacy are essential considerations. Teachers should inform students about recordings and ensure that data is handled in accordance with institutional policies and relevant regulations. Transparency helps build trust and encourages responsible use of the technology.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- recording lectures and sharing transcripts as structured notes;
- encouraging students to use transcripts for summarizing or revision;
- organizing group discussions and using transcripts to reflect on ideas;
- highlighting key concepts directly within transcripts for guided learning.

Gradual implementation and regular feedback from students can help optimize the use of the tool.

In conclusion, Otter.ai is a practical and accessible solution for integrating speech recognition into education. Its ability to capture, organize, and share spoken content supports diverse learners and contributes to more inclusive, flexible, and effective teaching practices.

2.1.3. ElevenLabs

ElevenLabs is an advanced AI-based text-to-speech (TTS) tool that generates highly realistic and natural-sounding voices. In educational contexts, it can support inclusive teaching, enhance content delivery, and provide flexible learning experiences for diverse student needs.

Teachers can use ElevenLabs to convert written learning materials—such as lectures, instructions, or readings—into high-quality audio content. This is particularly valuable for students with visual impairments, reading difficulties (e.g., dyslexia), or those who benefit from

auditory learning. Audio materials also allow students to engage with content in different contexts, such as during independent study or remote learning.

One of the key strengths of ElevenLabs is its ability to produce expressive and customizable speech. Educators can adjust voice tone, pacing, and style to match the learning context, making content more engaging and easier to understand. This can be especially useful in language learning, storytelling, or when explaining complex concepts that benefit from clear and dynamic narration.

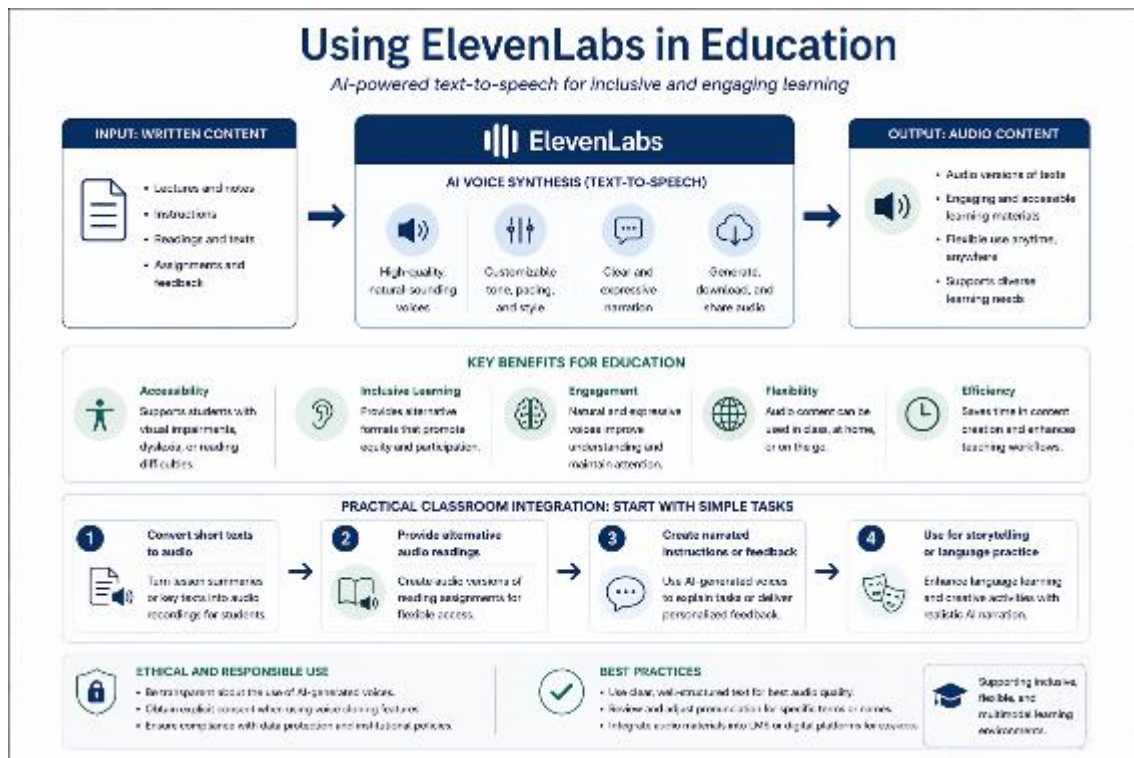


Fig. 2.3. ElevenLabs in Education (source: <https://chatgpt.com/>)

To use ElevenLabs effectively, teachers should ensure that input text is well-structured and clearly written, as this directly impacts the quality of generated audio. It is also advisable to review and, if necessary, adjust pronunciation settings for subject-specific terminology or names. Integrating audio materials into learning management systems or digital platforms can help ensure easy access for students.

Ethical considerations are important when using AI-generated voices. Teachers should be transparent about the use of synthetic speech and ensure that content is used responsibly. If voice cloning features are used, explicit consent and adherence to data protection policies are essential.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- converting short texts or lesson summaries into audio recordings for students;
- providing alternative audio versions of reading assignments;
- creating narrated instructions or feedback for assignments;

- using AI-generated voices for storytelling or language practice activities.

Gradual implementation, combined with student feedback, can help refine how the tool is used in teaching practice.

In conclusion, ElevenLabs offers powerful opportunities to enhance accessibility and engagement through high-quality voice synthesis. When thoughtfully integrated, it supports more inclusive, flexible, and multimodal learning environments.

2.1.4. Amazon Polly

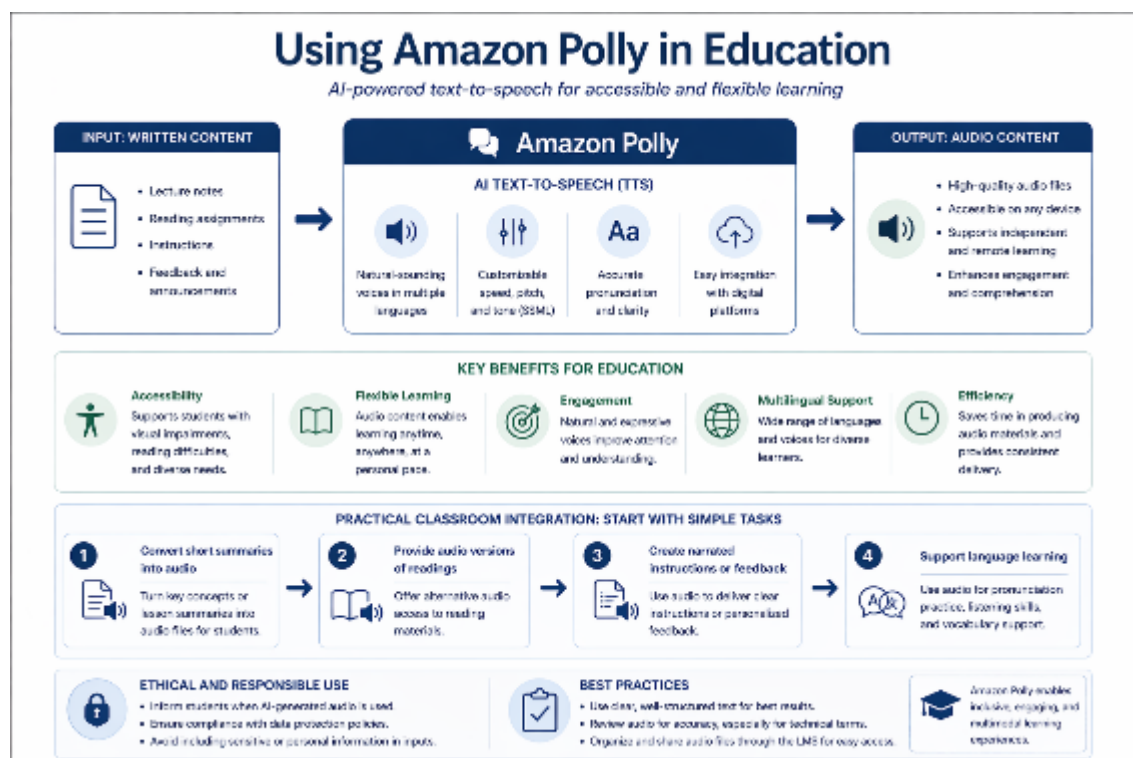


Fig. 2.4. Amazon Polly in Education (source: <https://chatgpt.com/>)

Amazon Polly is a cloud-based text-to-speech (TTS) tool that converts written text into natural-sounding speech using artificial intelligence. As part of [Amazon Web Services](#), it provides scalable and customizable voice solutions that can enhance accessibility and flexibility in education.

Teachers can use Amazon Polly to transform instructional materials—such as lecture notes, readings, and feedback—into audio format. This is especially useful for students with visual impairments, reading difficulties, or those who prefer auditory learning. Audio content supports self-paced and inclusive learning, allowing students to access materials in multiple ways.

One of the main strengths of Amazon Polly is its variety of voices and languages, along with the ability to adjust pronunciation, speed, and tone using SSML. This helps teachers tailor content to different learning needs, including language learning and clearer explanation of complex terms. Generated audio can also be easily integrated into learning platforms.

To ensure effective use, teachers should provide clear, well-structured text and review audio outputs for accuracy. Ethical considerations are important: students should be informed about the use of AI-generated audio, and data protection requirements must be followed.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- converting short lesson summaries into audio files;
- providing audio versions of reading materials;
- creating narrated instructions or feedback;
- supporting language learning with pronunciation-focused audio.

In summary, Amazon Polly supports inclusive, flexible, and multimodal learning by enabling easy creation of high-quality educational audio content.

2.1.5. Typecast

Typecast is an AI-based platform that enables users to create realistic voiceovers and animated video content from text. By combining text-to-speech (TTS) with expressive avatars and emotions, Typecast offers new possibilities for engaging, multimodal learning and inclusive teaching practices.

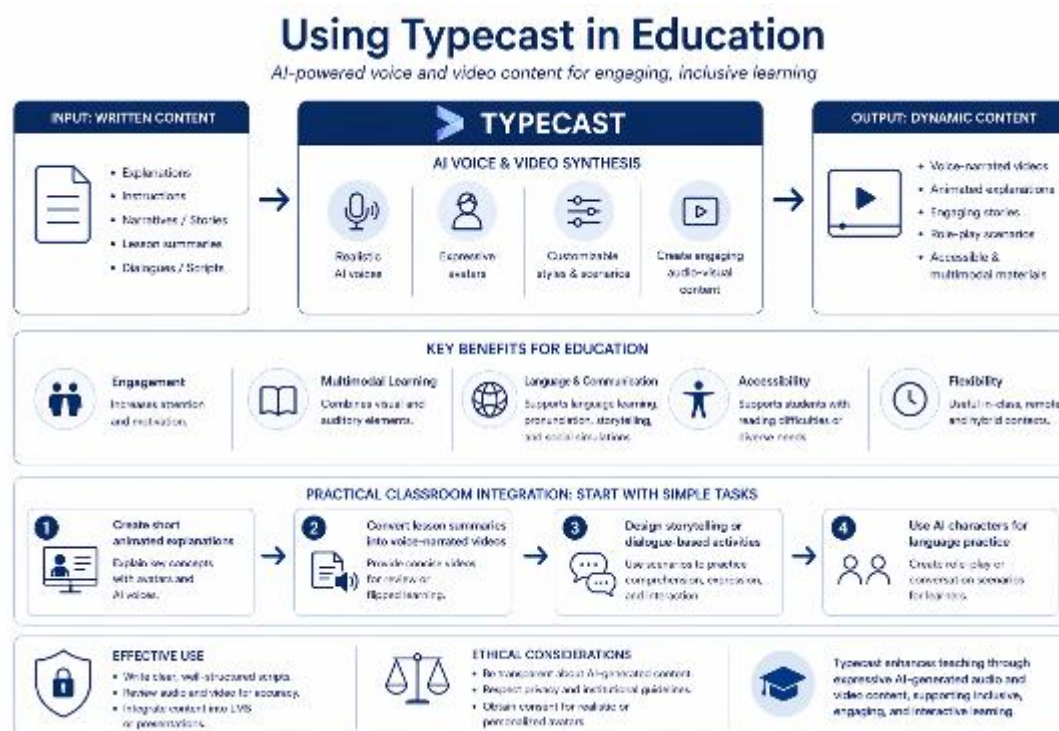


Fig. 2.5. Typecast in Education (source: <https://chatgpt.com/>)

Teachers can use Typecast to transform written educational materials—such as explanations, instructions, or narratives—into dynamic audio-visual content. This is particularly beneficial for students who prefer visual and auditory learning or who experience difficulties with traditional text-based materials. The use of expressive voices and characters can make complex concepts

more understandable and maintain student attention, especially in remote or digital learning environments.

One of the key strengths of Typecast is its ability to convey emotion and tone through AI-generated voices and avatars. Educators can select different characters, adjust speaking styles, and create scenario-based content, which is especially useful in language learning, storytelling, or social simulations. This supports not only content delivery but also the development of communication and interpretation skills.

To use Typecast effectively, teachers should prepare clear and well-structured scripts, as the quality of input text directly influences the output. It is also important to review generated audio and video for accuracy, clarity, and appropriateness. Integrating created content into learning management systems or presentations can help ensure easy access and consistent use.

Ethical considerations should not be overlooked. Teachers need to be transparent about the use of AI-generated voices and avatars and ensure that content respects privacy and institutional guidelines. If using realistic or personalized avatars, consent and responsible use are essential.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- creating short animated explanations of key concepts;
- converting lesson summaries into voice-narrated videos;
- designing storytelling or dialogue-based learning activities;
- using AI-generated characters for language practice or role-play scenarios.

Gradual implementation and student feedback can help refine the use of the tool and increase its effectiveness.

In conclusion, Typecast is a versatile tool that enhances teaching through expressive AI-generated audio and video content. When used thoughtfully, it supports inclusive, engaging, and interactive learning experiences across various educational contexts.

In general, tools such as Deepgram, Otter.ai, ElevenLabs, Amazon Polly, and Typecast demonstrate how AI-driven speech technologies can enhance accessibility, engagement, and flexibility in education. They support diverse learners by transforming spoken and written content into multiple formats, enabling more inclusive and personalized learning experiences. When applied thoughtfully, these tools help create efficient, multimodal teaching practices that adapt to different student needs.

2.2. Self-assessment questions for Module 1 Topic 2

- What are the key differences between text-to-speech (TTS) and speech-to-text (STT) technologies?
- How can TTS tools support students with reading or motor difficulties in learning environments?

- In what ways can STT technologies improve written communication for students with special educational needs?
- What role does artificial intelligence play in improving the accuracy of TTS and STT systems?
- How can these technologies be integrated into digital learning platforms and assessment systems?
- What are the main challenges in implementing TTS and STT tools in education?
- How can AI-driven speech technologies contribute to early diagnosis of learning or communication difficulties?
- What ethical and privacy considerations arise when using speech-based technologies for monitoring students?
- How can continuous monitoring through speech technologies support personalized learning?
- What criteria can be used to evaluate the effectiveness of TTS and STT tools in supporting accessibility and inclusion?

Topic 3. Voice assistants

Aim of the topic is to explore how voice assistants and conversational interfaces can support inclusive education by enabling hands-free access to content and facilitating communication for students with visual impairments or motor difficulties. It also seeks to examine their potential to enhance independence and reduce cognitive load, while addressing limitations such as speech recognition accuracy, privacy concerns, and the need for personalized adaptation.

3.1. Learning material (guidelines for teachers on how to use tool-based learning materials)

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

Microsoft Azure Cognitive Services (Speech + Conversational AI) is an advanced artificial intelligence platform that enables the development of speech recognition, text-to-speech, and conversational agent solutions. In an educational context, it offers significant potential to create inclusive, accessible, and personalized learning environments, particularly for students with visual impairments, motor difficulties, or learning challenges.

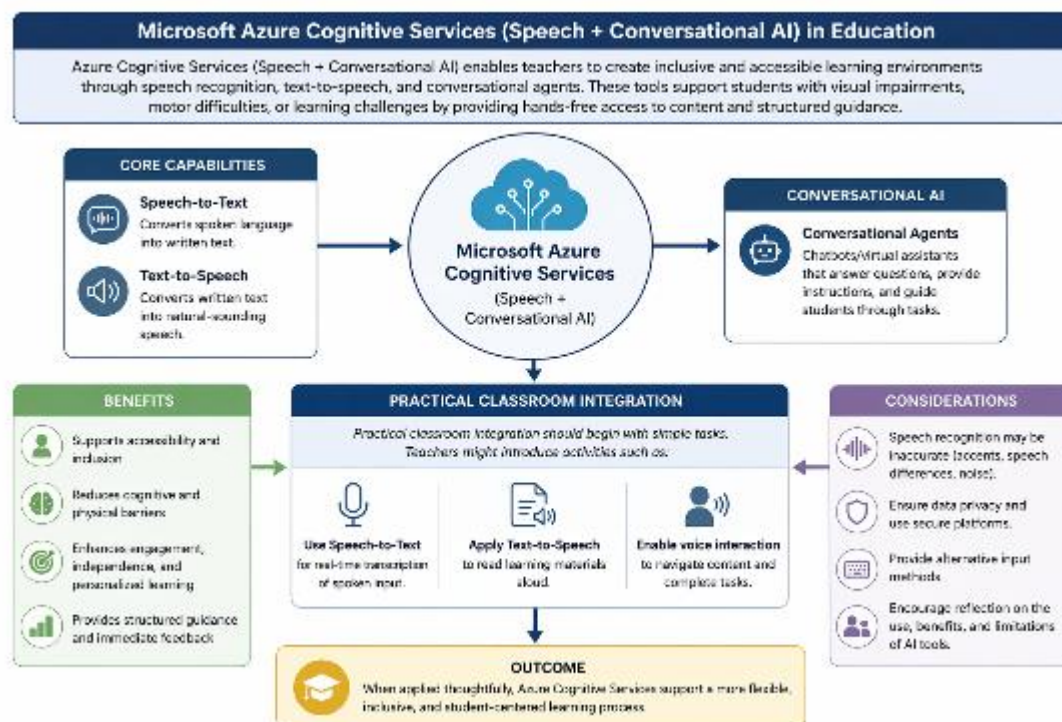


Fig. 3.1. Microsoft Azure Cognitive Services in Education (source: <https://chatgpt.com/>)

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- using Speech-to-Text to automatically transcribe students' spoken responses during lessons;
- applying Text-to-Speech to read digital learning materials aloud;

- allowing students to navigate content and complete tasks using voice commands.

These initial activities help students become familiar with the technology while reducing cognitive and physical barriers to learning.

As confidence grows, teachers can expand the use of Conversational AI by designing simple chatbots or virtual assistants that provide instructions, answer frequently asked questions, or guide students through learning tasks. These tools can support students who need structured guidance, immediate feedback, or repeated explanations, thereby enhancing independence and engagement.

Differentiation is a key advantage of this technology. Teachers can assign varied tasks based on student needs—for example, some learners may benefit from listening to content, while others may engage more effectively by creating voice-based projects or interactive dialogues. This approach supports diverse learning preferences and promotes active participation.

However, teachers should also be aware of potential challenges. Speech recognition systems may struggle with non-standard speech patterns, accents, or speech impairments, so alternative input methods should always be available. Additionally, privacy and data protection must be carefully considered, ensuring that students understand how their data is used and that secure platforms are employed.

Finally, reflective practices should be encouraged. Teachers can engage students in discussions about how these tools support their learning, what limitations they experience, and how the technology could be improved. This not only enhances digital literacy but also fosters critical thinking about the role of AI in education.

When thoughtfully implemented, Microsoft Azure Cognitive Services can significantly contribute to a more inclusive, flexible, and student-centered learning experience.

3.1.2. Google Dialogflow + Speech Services

Google Dialogflow combined with Google Speech-to-Text and Text-to-Speech provides a flexible environment for creating voice-enabled and conversational learning tools. These technologies allow teachers to design more inclusive and accessible learning experiences by enabling students to interact with content through speech, which is particularly beneficial for learners with visual impairments, motor difficulties, or language-related challenges.

Dialogflow supports the creation of conversational agents that can understand and respond to natural language, while Speech Services enable accurate speech recognition and natural-sounding voice output. Together, they help transform traditional learning materials into interactive and multimodal experiences, supporting different learning preferences and needs.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- using Speech-to-Text to capture and transcribe students' spoken responses;
- applying Text-to-Speech to read instructions or educational content aloud;
- allowing students to interact with a simple chatbot that answers basic questions related to the lesson.

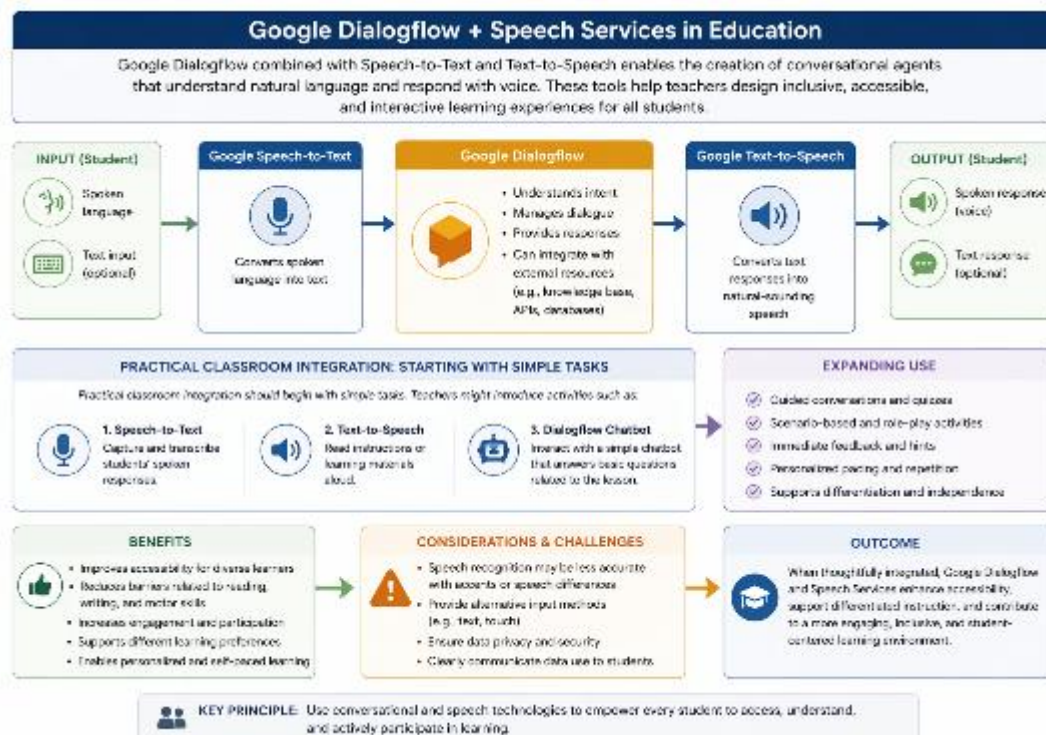


Fig. 3.2. Google Dialogflow + Speech Services in Education (source: <https://chatgpt.com/>)

These activities help lower participation barriers and increase engagement.

As students become more confident, teachers can expand the use of Dialogflow by designing guided conversations, quizzes, or scenario-based activities where learners interact with chatbots to practice knowledge and receive immediate feedback. This approach supports independent learning, repetition, and personalized pacing.

At the same time, it is important to consider potential challenges. Speech recognition may not always accurately interpret different accents or speech patterns, so alternative input options should be available. In addition, teachers must ensure responsible use of data and clearly communicate privacy considerations.

When thoughtfully integrated, Google Dialogflow and Speech Services can enhance accessibility, support differentiated instruction, and contribute to a more engaging and student-centered learning environment.

3.1.3. Amazon Alexa Skills Kit (ASK)

Amazon Alexa Skills Kit (ASK) is a platform that enables the creation of voice-driven applications ("skills") for Amazon Alexa. In education, it offers opportunities to design interactive, hands-free learning experiences that support accessibility and student engagement. Voice interfaces are particularly beneficial for learners with visual impairments, motor difficulties, or those who benefit from auditory learning, as they allow interaction with content through natural speech.

Using ASK, teachers can either adopt existing educational skills or create simple custom ones tailored to their lessons. These voice applications can deliver instructions, ask questions, provide feedback, or guide students through learning activities. Because interaction is conversational,

students can engage with content in a more intuitive and less text-dependent way, which helps reduce cognitive and physical barriers.



Fig. 3.3. Amazon Alexa Skills Kit (ASK) in Education (source: <https://chatgpt.com/>)

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- using Alexa to read out questions or learning materials;
- enabling students to answer orally and receive immediate feedback;
- interacting with simple quiz-based skills that reinforce key concepts.

These activities support participation and make learning more accessible, especially for students who struggle with reading or writing.

As experience grows, teachers can design more advanced uses by creating custom skills aligned with curriculum goals. For example, Alexa can be used for guided revision sessions, vocabulary practice, step-by-step instructions, or scenario-based learning where students respond to prompts and make decisions. This encourages active learning, repetition, and independent practice.

Differentiation is another key advantage. Students can interact with voice applications at their own pace, repeat instructions when needed, and receive personalized responses. Teachers can adapt the complexity and structure of skills to meet diverse learning needs, supporting a more inclusive classroom environment.

However, some challenges should be considered. Voice recognition may not always accurately interpret different accents or speech patterns, and reliance on predefined commands can limit flexibility. Privacy and data security are also important, so teachers should ensure safe use and clearly explain how data is handled.

When thoughtfully integrated, Amazon Alexa Skills Kit can enhance accessibility, engagement, and personalized learning, contributing to a more inclusive and student-centered educational experience.

3.1.4. Apple SiriKit + Accessibility APIs

Apple SiriKit together with Apple Accessibility APIs provides a powerful framework for creating voice-driven and accessible learning experiences within the Apple ecosystem. These tools enable teachers to support inclusive education by allowing students to interact with devices through voice commands, assistive features, and personalized accessibility settings. They are particularly beneficial for learners with visual impairments, motor difficulties, or cognitive challenges.

SiriKit allows apps to integrate with Apple Siri, enabling voice-based interactions such as sending messages, setting reminders, or performing specific learning-related tasks. Combined with Accessibility APIs—such as VoiceOver, Switch Control, and Speech features—teachers can ensure that content is perceivable, operable, and adaptable to individual student needs. This creates a more flexible and supportive learning environment.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- using Siri to set reminders for assignments or deadlines;
- enabling VoiceOver or Text-to-Speech to read instructions and learning materials aloud;
- allowing students to use voice commands to navigate apps or access content hands-free.

These activities reduce barriers to participation and help students become comfortable with assistive technologies.

As students gain confidence, teachers can expand usage by incorporating more structured, voice-supported learning activities. For example, students can use Siri to retrieve information, manage schedules, or support task organization, while accessibility features can assist in reading, writing, and interaction. This promotes independence, self-regulation, and active engagement in learning.

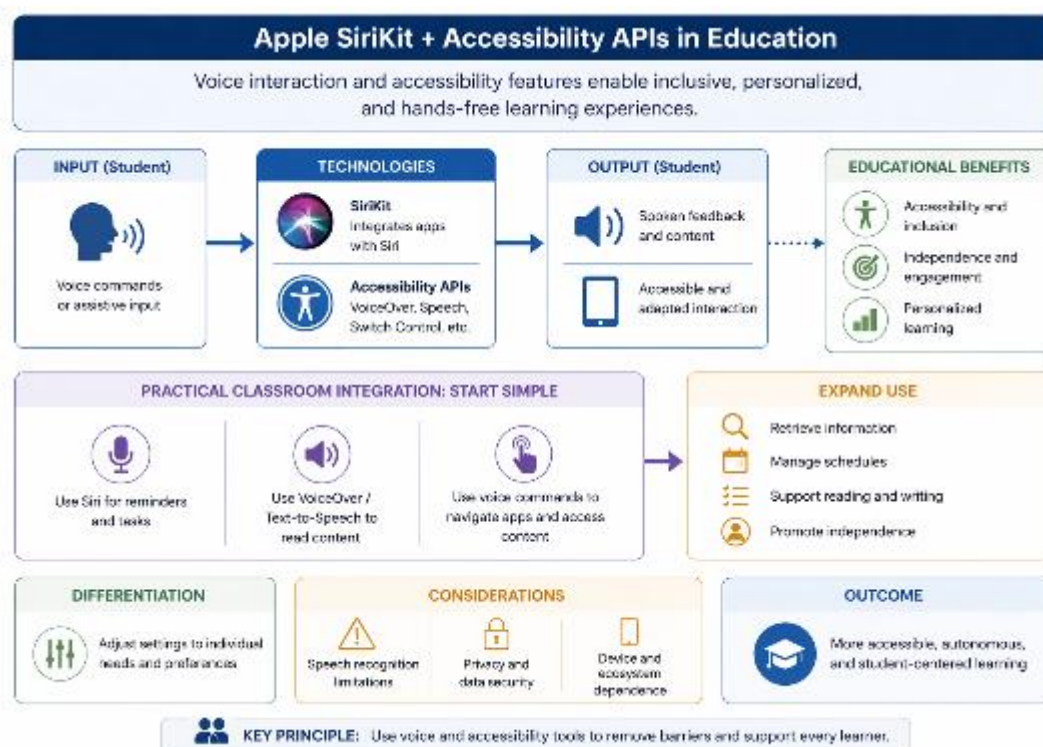


Fig. 3.4. Apple SiriKit + Accessibility APIs in Education (source: <https://chatgpt.com/>)

Differentiation is a key strength of these tools. Teachers can tailor accessibility settings to individual needs, adjusting speech rate, display preferences, or interaction modes. This ensures that each student can engage with content in a way that suits their abilities and learning preferences.

However, certain challenges should be considered. Voice recognition may not always accurately interpret different speech patterns or languages, and some functionalities depend on device compatibility or ecosystem limitations. Privacy and data security are also important, requiring careful management and clear communication with students.

When thoughtfully integrated, Apple SiriKit and Accessibility APIs can enhance accessibility, autonomy, and personalized learning, supporting a more inclusive and student-centered classroom environment.

3.1.5. OpenAI Voice & Realtime API

OpenAI Voice & Realtime API enables the development of real-time, voice-based and conversational applications that can respond instantly to user input. In education, these capabilities support the creation of interactive, adaptive, and inclusive learning environments where students can communicate naturally through speech and receive immediate, context-aware feedback.

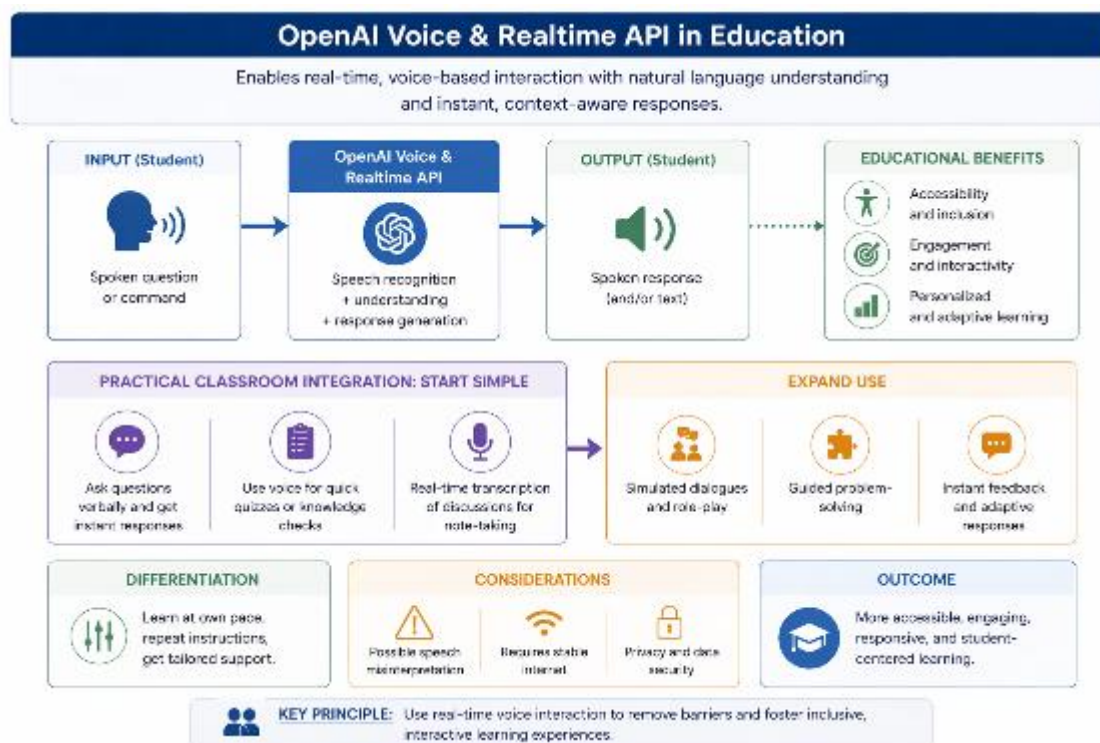


Fig. 3.5. OpenAI Voice & Realtime API in Education (source: <https://chatgpt.com/>)

The Voice and Realtime API allows seamless integration of speech recognition, natural language understanding, and speech synthesis into a single experience. This makes it possible to design tools such as voice tutors, interactive assistants, or real-time feedback systems that support students with diverse learning needs, including those with visual impairments, motor difficulties, or language-related challenges. By enabling fluid, conversational interaction, the technology reduces reliance on traditional text-based input and supports more intuitive engagement.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- allowing students to ask questions verbally and receive instant spoken responses;
- using voice interaction for quick quizzes or knowledge checks;
- enabling real-time transcription of discussions to support note-taking.

These activities help lower barriers to participation and create a more dynamic learning environment.

As students become more familiar with the technology, teachers can expand its use by incorporating interactive learning scenarios, such as simulated dialogues, role-playing activities, or guided problem-solving sessions with a voice assistant. The system can provide immediate feedback, prompt further thinking, and adapt responses based on student input, supporting personalized and self-paced learning.

Differentiation is a key benefit of real-time voice interaction. Students can engage at their own pace, repeat instructions, and receive tailored support depending on their responses. Teachers

can design activities that accommodate different learning styles, encouraging both independent exploration and collaborative discussion.

However, several considerations should be addressed. Real-time speech systems may occasionally misinterpret input, particularly with diverse accents or speech patterns. Additionally, constant connectivity is required for real-time processing, and privacy concerns must be carefully managed, ensuring transparent and secure handling of student data.

When thoughtfully integrated, OpenAI Voice & Realtime API can enhance accessibility, engagement, and responsiveness in the classroom, supporting a more inclusive, interactive, and student-centered approach to learning.

In general, Voice-based and conversational AI tools such as Microsoft Azure Cognitive Services, Google Dialogflow, Amazon Alexa Skills Kit, Apple SiriKit, and OpenAI Voice & Realtime API collectively enhance inclusive education by enabling natural, hands-free interaction with learning content. They support accessibility, personalization, and student engagement while helping reduce cognitive and physical barriers. However, effective use requires attention to limitations such as speech recognition accuracy, privacy, and the need for thoughtful pedagogical integration.

3.2. Self-assessment questions for the Module 1 Topic 3

- What are voice assistants and how do they function in educational contexts?
- How can voice assistants support students with visual impairments or motor difficulties?
- In what ways do conversational interfaces enable hands-free access to learning content?
- How can voice assistants enhance student independence in inclusive education settings?
- What is meant by reducing cognitive load, and how can voice assistants contribute to it?
- What are the main limitations of voice assistants in education, particularly regarding speech recognition accuracy?
- What privacy and data security concerns are associated with the use of voice assistants?
- Why is personalization important when implementing voice assistants for students with special needs?
- How can voice assistants be integrated into existing educational platforms and tools?
- What methods can be used to evaluate the effectiveness of voice assistants in supporting inclusive learning?

Topic 4. Educational platforms with AI functionalities

The aim of this topic is to explore how AI-powered educational platforms can enhance accessibility and inclusivity by providing diverse ways for students to demonstrate their knowledge, regardless of disabilities. It also seeks to address ethical considerations, ensuring that AI systems are fair, unbiased, and designed to support all learners effectively.

4.1. Learning material (guidelines for teachers on how to use tool-based learning materials)

4.1.1. Khan Academy / Khanmigo

Khan Academy and its AI-powered assistant Khanmigo provide teachers with a structured, adaptive, and student-centered learning environment. These tools combine high-quality instructional content with artificial intelligence to support personalized learning, formative assessment, and inclusive classroom practices.

Teachers can use Khan Academy as a foundational platform for delivering curriculum-aligned content across subjects such as mathematics, science, and humanities. The system allows students to learn at their own pace, offering instant feedback, hints, and step-by-step explanations. Khanmigo enhances this experience by acting as a virtual tutor and teaching assistant, guiding students through problem-solving processes rather than simply providing answers. This encourages critical thinking, reflection, and deeper conceptual understanding.

From a pedagogical perspective, teachers should integrate these tools to support differentiated instruction. Students with varying abilities can access the same topic at different levels of complexity, while AI-driven recommendations help identify gaps in knowledge. Khanmigo can assist learners who need additional scaffolding by prompting them with guiding questions, while more advanced students can engage in exploratory dialogue and extended problem-solving.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- Assigning specific Khan Academy exercises for independent or homework practice;
- Using Khanmigo during class to model problem-solving strategies step by step;
- Encouraging students to ask Khanmigo questions when they encounter difficulties;
- Reviewing AI-generated insights to monitor student progress and adapt instruction accordingly.

Assessment practices can also be enriched through these tools. Teachers can track student performance in real time, identify misconceptions, and provide timely interventions. Importantly, students can demonstrate their understanding through interaction, explanation, and reasoning, rather than relying solely on traditional written responses.

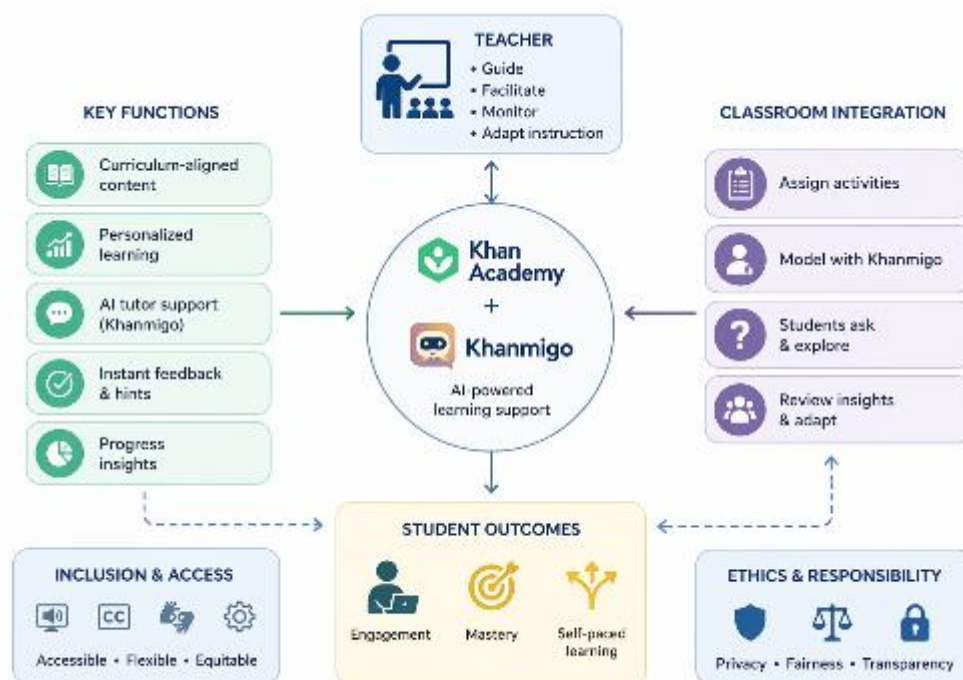


Fig. 4.1. Khan Academy / Khanmigo in Education (source: <https://chatgpt.com/>)

However, teachers should remain mindful of ethical and pedagogical considerations. AI tools should complement—not replace—teacher guidance. It is essential to ensure equitable access to devices and internet connectivity, and to critically evaluate AI-generated responses for accuracy and bias. Teachers are encouraged to foster digital literacy by discussing with students how AI works and how to use it responsibly.

In conclusion, Khan Academy and Khanmigo offer powerful opportunities to create inclusive, adaptive, and engaging learning environments. When thoughtfully integrated, they support both individualized learning pathways and effective classroom management, while maintaining the central role of the teacher in guiding and contextualizing the learning process.

4.1.2. Read&Write by Texthelp

Read&Write by Texthelp is an assistive literacy tool designed to support reading, writing, and comprehension for diverse learners. It integrates with common platforms (e.g., Google Docs, web browsers, PDFs) and provides features such as text-to-speech, speech-to-text, word prediction, vocabulary support, and screen masking. These functionalities make it especially valuable in inclusive classrooms, where students may have different learning needs, including dyslexia, language barriers, or other learning difficulties.

Teachers can use Read&Write to enhance accessibility and promote independent learning. The text-to-speech function allows students to listen to written content, supporting comprehension and reducing cognitive load. This is particularly beneficial for learners who struggle with decoding or reading fluency. At the same time, speech-to-text tools enable students to express their ideas verbally, which can help those who find writing challenging. Word prediction and vocabulary tools assist in building writing confidence and accuracy.

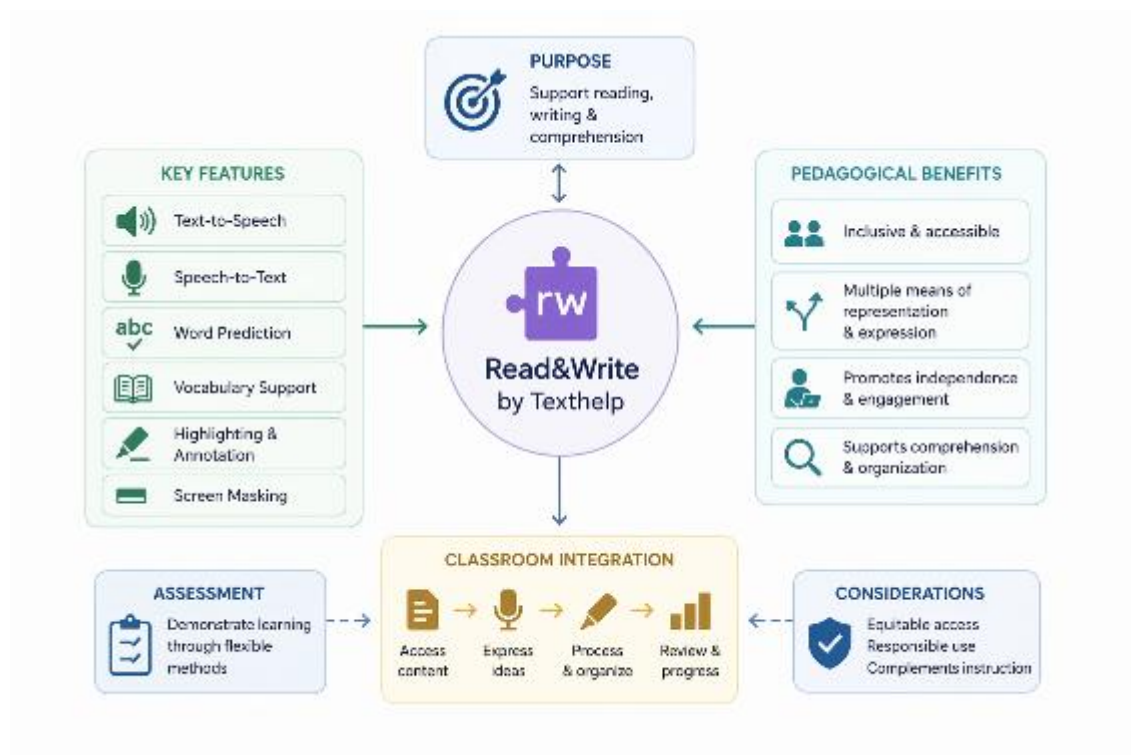


Fig. 4.2. Read&Write by Texthelp in Education (source: <https://chatgpt.com/>)

From a pedagogical perspective, the tool aligns well with Universal Design for Learning (UDL) principles by offering multiple means of representation and expression. Teachers can provide materials in flexible formats, allowing students to engage with content through listening, reading, or interacting with visual supports. Additionally, features such as highlighting and annotation encourage active reading strategies and help students organize information effectively.

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- Asking students to use text-to-speech to review digital texts or instructions;
- Encouraging speech-to-text for drafting short responses or reflections;
- Using highlighting tools to identify key ideas in a text;
- Supporting vocabulary development through built-in dictionaries and picture dictionaries.

As students become more familiar with the tool, teachers can gradually incorporate it into more complex tasks, such as essay writing, research activities, and collaborative projects. This progression helps learners build autonomy while maintaining structured support.

Assessment practices can also be adapted using Read&Write. Students can demonstrate understanding through alternative formats, such as oral responses or supported writing, ensuring that assessment focuses on knowledge rather than limitations in reading or writing skills. Teachers can observe how students use the tool and adjust instruction to better meet individual needs.

It is important to consider ethical and practical aspects when using assistive technologies. Teachers should ensure equitable access to devices and provide guidance on responsible tool use. Additionally, while Read&Write offers significant support, it should complement—not replace—explicit instruction in literacy skills.

In conclusion, Read&Write by Texthelp is a powerful tool for fostering inclusive and accessible learning environments. When thoughtfully integrated into teaching practices, it empowers students to overcome barriers, engage more fully with content, and develop essential literacy skills.

4.1.3. AccessiLearnAI

AccessiLearnAI is an AI-driven educational platform designed to enhance accessibility, personalization, and inclusion in learning environments. It supports diverse learners by adapting content, providing multimodal interaction options, and enabling flexible ways for students to engage with and demonstrate their knowledge. The tool is particularly relevant in inclusive education contexts, where students may have varying cognitive, linguistic, or physical needs.

Teachers can use AccessiLearnAI to create adaptive learning experiences that respond to individual student profiles. The platform can modify content presentation—offering text, audio, visual supports, or simplified language—depending on learner preferences and needs. This flexibility helps reduce barriers for students with reading difficulties, language learners, or those requiring additional scaffolding. At the same time, more advanced learners can access enriched or extended materials, supporting differentiated instruction within the same classroom.

A key strength of AccessiLearnAI lies in its multimodal interaction capabilities. Students can interact with the system through speech, text, or visual inputs, and they can respond using various formats such as oral explanations, images, or structured text. This aligns with inclusive pedagogical approaches by allowing multiple means of expression, ensuring that assessment reflects students' understanding rather than their limitations in a specific skill (e.g., writing).

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- Allowing students to choose how they access learning materials (e.g., listening vs. reading);
- Encouraging alternative response formats, such as voice recordings or visual summaries;
- Using AI-generated prompts to support comprehension and guide learning;
- Monitoring AI feedback to identify learning gaps and adjust instruction.

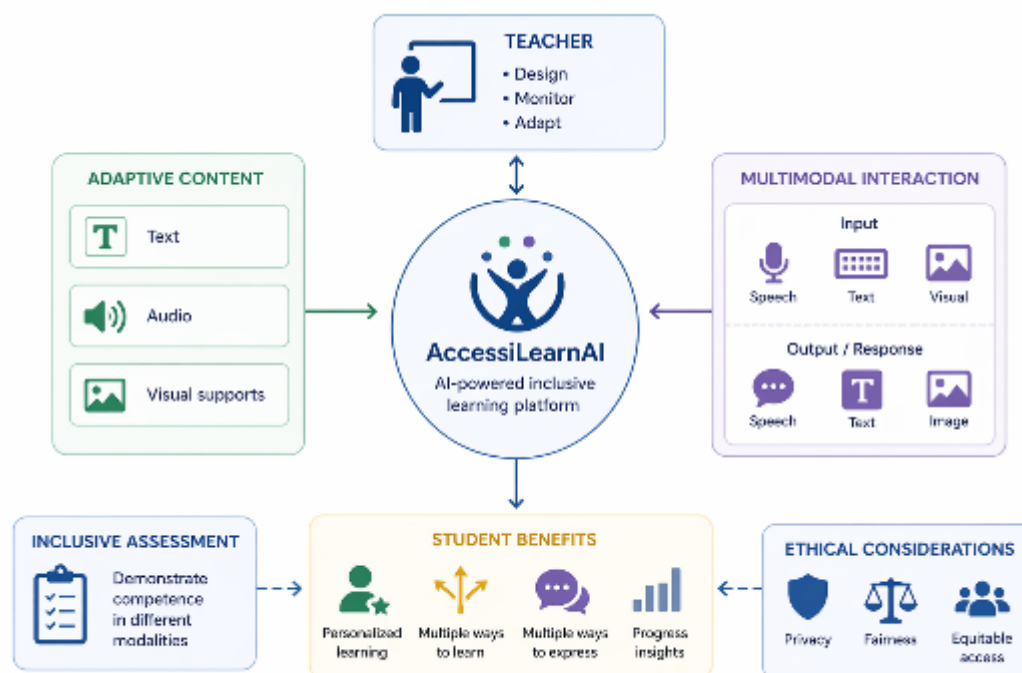


Fig. 4.3. AccessiLearnAI in Education (source: <https://chatgpt.com/>)

As teachers gain confidence with the platform, they can expand its use to collaborative learning scenarios, project-based tasks, and continuous formative assessment. AccessiLearnAI can provide insights into student progress, engagement patterns, and areas requiring support, enabling more informed and timely pedagogical decisions.

Assessment practices can be significantly enhanced through the platform. Teachers can design inclusive assessments where students demonstrate competence through different modalities. AI-supported analysis can help identify patterns in student responses, offering a deeper understanding of learning progress while supporting early intervention.

However, ethical considerations remain essential. Teachers should ensure that AI use respects student privacy, avoids bias, and promotes fairness. It is important to critically evaluate AI outputs and involve students in discussions about responsible and transparent use of technology. Equitable access to devices and connectivity must also be considered to prevent further educational disparities.

In conclusion, AccessiLearnAI offers a comprehensive approach to inclusive, adaptive, and student-centered learning. When thoughtfully integrated, it empowers teachers to address diverse needs while fostering engagement, autonomy, and meaningful learning outcomes.

4.1.4. NeuroChat (Neuroadaptive AI)

NeuroChat is a neuroadaptive AI tool designed to personalize learning experiences by responding to students' cognitive, emotional, and behavioral patterns in real time. Unlike traditional AI systems that rely mainly on performance data, NeuroChat integrates signals such as attention, engagement, response time, and interaction style to dynamically adjust content

and support. This makes it particularly valuable in inclusive education, where learners may differ significantly in how they process information and maintain focus.

Teachers can use NeuroChat to create highly responsive learning environments that adapt not only to what students know, but also to how they learn. The system can modify task difficulty, pacing, and feedback style based on individual learner profiles. For example, if a student shows signs of cognitive overload or reduced attention, NeuroChat may simplify instructions, provide additional scaffolding, or introduce alternative formats such as visual aids or guided prompts. Conversely, students demonstrating strong engagement and understanding can be offered more complex or exploratory tasks.

A key pedagogical advantage of NeuroChat lies in its ability to support self-regulated learning. By providing timely feedback and adaptive prompts, the tool encourages students to reflect on their learning strategies, maintain focus, and gradually build autonomy. This is particularly beneficial for students with attention-related challenges or executive functioning difficulties, as the system can gently guide them back on task without interrupting the learning flow.

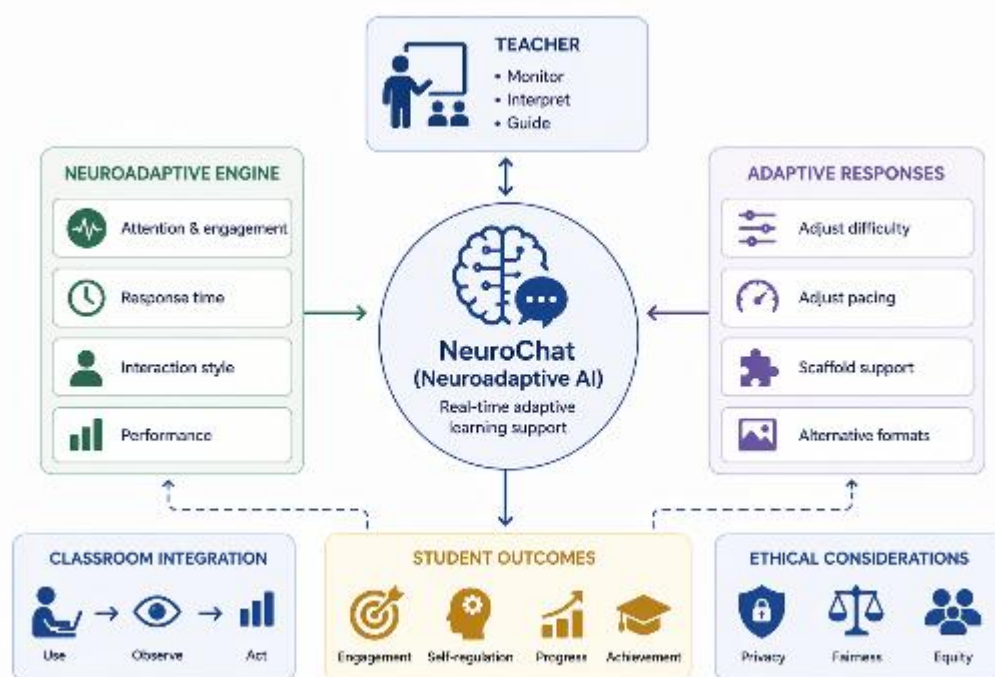


Fig. 4.4. NeuroChat (Neuroadaptive AI) in Education (source: <https://chatgpt.com/>)

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- Using NeuroChat as a guided support tool during independent work;
- Allowing students to interact with the system for step-by-step assistance;
- Observing how the AI adapts to different learners and discussing these patterns;
- Using AI-generated insights to identify when students need additional support or challenge.

As familiarity increases, teachers can integrate NeuroChat into more complex learning scenarios, including project-based learning, differentiated group work, and continuous formative assessment. The system's analytics can provide valuable insights into student engagement, helping teachers make informed instructional decisions.

Assessment can also be enhanced through neuroadaptive features. Instead of relying solely on static tasks, teachers can design dynamic assessments that adjust in real time, allowing students to demonstrate their competence under conditions that reflect their individual learning needs. This approach supports fairness and reduces the impact of factors such as anxiety or attention fluctuations.

However, the use of neuroadaptive AI raises important ethical considerations. Teachers must ensure that data related to cognitive and behavioral patterns is handled responsibly, with strong attention to privacy and transparency. It is essential to critically interpret AI recommendations and avoid over-reliance on automated decisions. Additionally, equitable access to such advanced technologies should be considered to prevent widening educational inequalities.

In conclusion, NeuroChat represents an innovative step toward deeply personalized and inclusive education. When used thoughtfully, it enables teachers to better understand and support diverse learners, fostering engagement, self-regulation, and meaningful learning outcomes.

4.1.5. Audemy

Audemy.org is an AI-supported educational platform designed to provide flexible, accessible, and personalized learning experiences. It combines structured course delivery with adaptive technologies that respond to individual learner needs, making it suitable for inclusive and diverse classroom contexts.

Teachers can use Audemy.org to complement traditional instruction with digital content that supports self-paced and differentiated learning. The platform offers modular learning materials, interactive tasks, and AI-assisted feedback, allowing students to engage with content in ways that match their abilities and preferences. For example, learners can revisit materials, access simplified explanations, or explore more advanced topics depending on their progress.

A key strength of Audemy.org lies in its adaptive learning capabilities. The system analyzes student performance and interaction patterns to recommend appropriate content and adjust task difficulty. This helps teachers address heterogeneous classrooms more effectively, ensuring that both struggling and advanced learners remain engaged. In addition, AI-generated feedback provides immediate support, helping students understand mistakes and improve independently.

From a pedagogical perspective, the platform aligns with student-centered and inclusive teaching approaches. It enables multiple pathways for learning by offering various content formats and interaction options. Students can learn through reading, watching, or engaging in interactive exercises, while also demonstrating their understanding through different forms of response. This flexibility supports learners with diverse needs, including those with language barriers or learning difficulties.

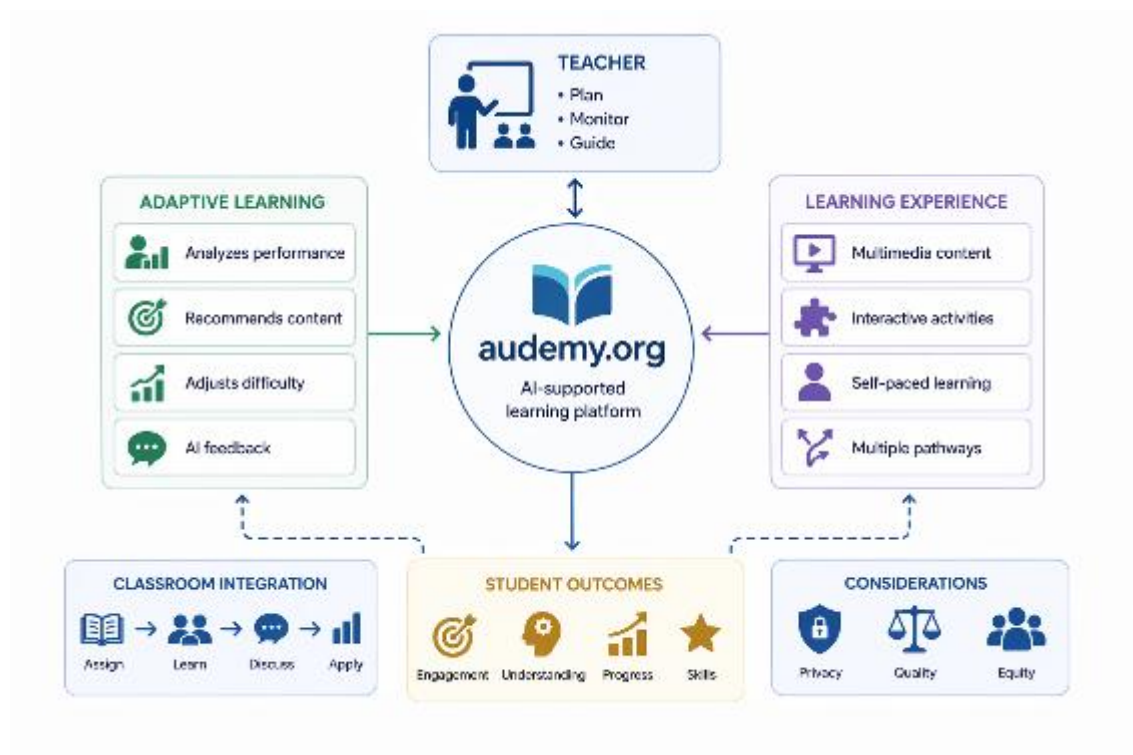


Fig. 4.5. Audemy in Education (source: <https://chatgpt.com/>)

Practical classroom integration should begin with simple tasks. Teachers might introduce activities such as:

- Assigning short Audemy modules as homework or supplementary practice;
- Encouraging students to complete interactive exercises and review AI feedback;
- Using platform analytics to monitor student progress and identify learning gaps;
- Facilitating classroom discussions based on completed digital content.

As teachers gain experience, Audemy.org can be integrated into more complex learning scenarios, such as blended learning models, flipped classrooms, or project-based activities. Students can independently explore topics and then apply their knowledge in collaborative or practical tasks during class time.

Assessment practices can also be enhanced through the platform. Teachers can use performance data and activity completion as part of formative assessment, while also allowing students to demonstrate understanding through varied formats. This approach ensures that evaluation focuses on learning outcomes rather than limitations in specific skills.

However, it is important to consider ethical and practical aspects. Teachers should ensure that all students have equitable access to the platform and understand how to use it effectively. Additionally, AI-generated recommendations and feedback should be critically reviewed, and student data privacy must be protected.

In conclusion, Audemy.org provides a flexible and adaptive learning environment that supports inclusive, personalized, and engaging education. When thoughtfully integrated into teaching

practice, it enhances both student autonomy and teacher insight, contributing to more effective and equitable learning experiences.

In general, AI-powered educational tools such as Khanmigo, Read&Write, AccessiLearnAI, NeuroChat, and Audemy.org collectively support inclusive, personalized, and flexible learning by adapting content, interaction, and assessment to diverse student needs. They empower teachers to implement differentiated instruction while enabling students to engage with learning through multiple pathways and demonstrate their knowledge in varied formats. At the same time, their effective use requires attention to ethical considerations, including equity, privacy, and responsible integration into pedagogical practice.

4.2. Self-assessment questions for the Module 1 Topic 4

- What are AI-powered educational platforms and how do they differ from traditional learning systems?
- How can AI functionalities improve accessibility for students with different types of disabilities?
- In what ways can AI enable students to demonstrate their knowledge beyond traditional assessments?
- How do adaptive learning systems personalize content for individual student needs?
- What role does data play in the functioning of AI-based educational platforms?
- What are the main ethical concerns associated with using AI in education?
- How can bias in AI systems affect inclusivity and fairness in learning environments?
- What strategies can be used to ensure AI systems are designed to support all learners effectively?
- How can teachers integrate AI-powered platforms into their teaching practices?
- What criteria can be used to evaluate the effectiveness and inclusivity of AI-driven educational tools?

Module 2. AI TOOLS SUPPORTING STUDENTS WITH SENSORY DISABILITIES

Authors: Natalia Mortun & Gerhard Fischerauer

Duration 20 hours

Introduction

This module focuses on practical ways to make teaching and learning more accessible for students with sensory disabilities. It introduces simple, widely available tools that support students in accessing content, communicating and demonstrating their knowledge in different ways. Many barriers in everyday teaching are not intentional. These barriers arise when materials are difficult to read, communication relies on a single format, or visual or audio information is not supported by alternative methods. Small adjustments combined with the right tools can make a significant difference.

The four topics in this module address different aspects of accessibility:

- access to text through screen readers;
- communication through sign language and captions;
- visual access through magnification tools; and
- understanding visual information through audio description.

Each topic is based on real classroom situations and focuses on what teachers can realistically achieve without making major changes to their courses.

The goal of this module is not to replace existing teaching practices, but to supplement them. By offering flexible ways of accessing and expressing knowledge, teachers can create a more inclusive learning environment in which students can participate more fully and effectively.

Topic 1. Screen readers converting text to speech or Braille

Authors: Gerhard Fischerauer, Natalia Morkun

Duration 2 hours

1.1. Introduction of the scenario

In higher education, most learning materials are provided in digital formats such as PDFs, presentations, and online platforms. For students with visual impairments, access to these materials can be significantly limited when content is not designed in an accessible way. Screen readers are AI-based assistive technologies that convert text and interface elements into speech or Braille, enabling students to navigate digital environments independently. These tools support participation in lectures, access to learning materials, and completion of academic tasks. This scenario focuses on the use of screen readers in academic contexts and highlights how they can improve accessibility and inclusion for students with visual impairments.

1.2. Guiding to use the tool NVDA

NVDA: <https://www.nvaccess.org/>



NVDA (NonVisual Desktop Access) is a free, open-source screen reader designed for blind and visually impaired users. It enables access to the Windows operating system and a wide range of third-party applications by converting on-screen text into speech or Braille output.

The tool supports commonly used software, including web browsers (such as Mozilla Firefox and Google Chrome), email clients, office applications (Microsoft Word and Excel), and communication platforms. NVDA includes a built-in speech synthesizer with support for more than 55 languages and is compatible with additional third-party voice systems.

NVDA provides advanced accessibility features such as automatic reading of text under the cursor, reporting of text formatting, and compatibility with refreshable Braille displays. It also includes built-in optical character recognition (OCR), allowing users to access content from scanned documents and images.

The tool can be run without installation from a USB device, making it highly portable. It is compatible with modern Windows operating systems and integrates with existing accessibility features such as Magnifier and voice input tools.

NVDA is supported by an active global community and offers additional functionality through an integrated add-on system, including extensions for remote access and AI-based image description.

PROS - ADVANTAGES	CONS - DISADVANTAGES
Free and open-source (no licensing costs)	Requires Windows operating system (not available for macOS or Linux as a primary solution)
Supports a wide range of applications (browsers, office tools, email)	May require initial training for effective use
Built-in speech synthesizer with multilingual support	Performance depends on document structure and formatting
Compatible with Braille displays	Advanced features may require additional configuration
Includes OCR for reading inaccessible PDFs and images	Some add-ons require technical knowledge to install and manage
Portable (can run from USB without installation)	
Active user and developer community	
Expandable through add-ons (including AI-based features)	
Works with modern Windows accessibility tools	

1.3. Practical component

Implementation example based on NVDA Quick Start Guide

Context: A student with visual impairment uses NVDA to access course materials (PDF, LMS, web content).



Step 1. Accessing and installing NVDA

- Open a web browser
- Go to: <https://www.nvaccess.org/download>
- Download the NVDA installer
- Run the downloaded file
- Select:
 - o *Install NVDA on this computer*
 - o *or Create portable copy (for USB use)*

NVDA can be installed locally or used as a portable version without installation



Step 2. Starting NVDA

- Press **Ctrl + Alt + N** to start NVDA
- NVDA begins reading system content automatically

When NVDA starts, it provides spoken feedback for all actions and interface elements

Step 3. Basic navigation and reading

The student uses keyboard commands to interact with content:

Basic NVDA navigation commands

Function	Key (Desktop/Laptop)	Description
Start NVDA	Ctrl + Alt + N	Starts or restarts NVDA
Exit NVDA	NVDA + Q → Enter	Exits NVDA
Pause / Resume speech	Shift	Pauses or resumes speech
Stop speech	Ctrl	Immediately stops speech

Reading and navigation

Function	Key (Desktop/Laptop)	Description
Read all text	NVDA + ↓	Reads continuously from current position
Read current line	NVDA + ↑	Reads current line
Read selected text	NVDA + Shift + ↑	Reads selected text
Read clipboard	NVDA + C	Reads copied text
Navigate elements	Tab	Moves between links/buttons
Next heading (web)	H	Jumps to next heading
Next link (web)	K	Jumps to next link

These commands allow students to efficiently navigate and access digital learning materials without visual interaction.

Step 4. Working with learning materials

Example: PDF or lecture notes

If the document is accessible:

- NVDA reads headings and structure
- student navigates between sections

If the document is not accessible:

- content is read incorrectly or not at all

Example: LMS (e.g., Moodle)

The student:

- navigates menus using Tab
- listens to links and buttons
- accesses assignments independently

Step 5. Using additional features

- OCR function allows reading scanned documents
- speech settings can be adjusted (speed, voice)
- add-ons can extend functionality (e.g., AI image description)

NVDA enables independent access to digital learning environments, but its effectiveness depends on the accessibility of teaching materials and platform structure.

Example: Using NVDA in a technical lecture
Course: Foundations of Embedded Systems
Topic: Memory & I/O architecture in microcontrollers
Challenge
The lecture includes:
- complex diagrams (e.g., memory structure, bus matrix) - multiple visual elements (Flash, SRAM, peripherals) - layered technical explanations
For students using screen readers, such content is difficult to interpret without additional support.

Adaptation using NVDA-compatible approach

Step 1. Structuring the slide content

Instead of presenting information only visually, the teacher:

- separates content into logical blocks:
 - Flash (program memory)
 - SRAM (working memory)
 - Peripherals (I/O registers)
- provides text-based explanations alongside diagrams

NVDA can read structured text sequentially

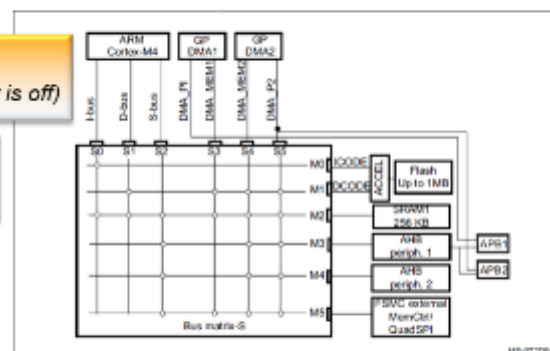
Memory & I/O at a glance

One address space for code, data and devices

1. Flash (Program)
stores your app & constants (keeps data when power is off)

2. SRAM (Working table)
fast scratchpad for variables & buffers

3. Peripherals (Registers)
configure & read devices via addresses



Inside the chip, a **32-bit multi-AHB bus matrix** links the CPU, DMA, Flash, SRAM and peripheral buses (**APB1/APB2**, plus AHB peripheral domains).

Source: STM32F412 - Reference manual
<https://www.st.com/>

This lets the system move data efficiently even when several blocks are active.

Step 2. Supporting diagram interpretation

When presenting a diagram (e.g., memory architecture):

The teacher should:

- verbally describe the structure:

"The system consists of three main components: Flash memory for program storage, SRAM for working data, and peripherals for communication."

- explain relationships:
“All components are connected via a bus system that allows data exchange between CPU and memory.”

This allows students to build a mental model of the system

Step 3. Providing alternative descriptions

For key visual elements, the teacher should provide:

- > short textual summaries (1–2 sentences)
- > structured explanations (bullet points)

Example:

- 1) Flash: stores program code, non-volatile
- 2) SRAM: temporary storage for variables
- 3) Peripherals: interface with external devices

NVDA reads this clearly and in logical order

Step 4. Supporting independent study

After the lecture, the teacher provides:

- accessible lecture notes
- simplified textual explanations of diagrams
- clearly structured summaries

Students can review materials using NVDA independently

Recommended way to present complex diagrams

When using diagrams like the one shown:

✗ Avoid:	✓ Use instead:
“As you can see here...”	structured verbal explanation
pointing without explanation	clear sequencing (first → second → third)
relying only on visual layout	consistent terminology

Example of good explanation

✗ Instead of:	✓ Use:
“This block connects here and here”	“The CPU connects to memory through a bus system. The bus allows data to move between Flash, SRAM, and peripheral components.”

Key takeaway

In technically complex courses, accessibility is not only about tools like NVDA, but about how information is structured and explained. Well-designed explanations can make even complex engineering content accessible to students using screen readers.

Recommendations for teachers

To effectively support students using screen readers such as NVDA, teachers should consider the following:

- **Provide accessible learning materials**
 - Use structured headings in documents (not only visual formatting)
 - Avoid scanned PDFs without text recognition
 - Use readable formats (Word, accessible PDF, HTML)
- **Describe visual content**
 - Verbally explain graphs, diagrams, and images during lectures
 - Provide alternative text for key visuals
- **Organise content clearly**
 - Use consistent structure in LMS (modules, topics, naming)
 - Avoid overly complex navigation
- **Share materials in advance**
 - Upload lecture slides and readings before class
 - Allow students to prepare using screen readers
- **Test accessibility (basic level)**
 - Open your materials and try simple keyboard navigation
 - Check if content can be followed without using a mouse
- **Combine tools with pedagogy**
 - Screen readers support access, but do not replace teaching
 - Use clear explanations, repetition, and structured delivery

Key message for teachers

Accessible teaching is not only about using tools, but about designing learning materials that can be effectively interpreted by assistive technologies.

1.4. Self-assessment questions for the Module 2 Topic 1

1. A lecturer uploads course material for a technical subject, including diagrams and explanations, as scanned PDF files. A student using NVDA reports that the content is difficult to navigate and partially unreadable. The lecturer wants to improve accessibility without completely redesigning the course. What is the most appropriate solution?
 - a) Ask the student to use a different tool instead of NVDA
 - b) Provide text-based versions of the materials and add short descriptions of key diagrams
 - c) Reduce the amount of course content to simplify navigation
 - d) Replace diagrams with external links to websites

Correct answer: B

2. During a lecture, the teacher frequently says “as you can see here” while presenting complex diagrams.

Why can this be problematic for students using screen readers?

- a) Screen readers cannot process spoken language
- b) Students using NVDA cannot hear the teacher
- c) Visual references without explanation are not accessible via screen readers
- d) NVDA automatically translates visual content into speech

Correct answer: C

3. A student using NVDA is navigating a course in the LMS but struggles to find materials.

Which design issue is the most likely cause?

- a) The student does not know how to use NVDA
- b) The LMS contains too many visual elements
- c) The course structure is unclear or inconsistent
- d) The student is using an outdated browser

Correct answer: C

4. In a technical course with complex diagrams (e.g., microcontroller architecture), what is the most effective way to support students using screen readers?

- a) Remove all diagrams from the lecture
- b) Replace lectures with written materials only
- c) Provide structured verbal explanations and textual descriptions of diagrams
- d) Ask students to work only in groups

Correct answer: C

5. Which of the following best reflects the teacher’s role when using tools like NVDA in inclusive education?

- a) The tool replaces the need for adapting teaching materials
- b) The teacher is not responsible for accessibility
- c) The teacher ensures materials are structured and accessible for assistive technologies
- d) The tool automatically adapts all content

Correct answer: C

Topic 2. Systems for automatic sign language translation into text and vice versa

Authors: Gerhard Fischerauer, Natalia Morkun

Duration 2 hours

2.1. Introduction of the scenario

Students who use sign language as their primary mode of communication often face barriers in accessing spoken content during lectures, discussions, and online learning activities. While human interpreters remain the most accurate solution, they are not always available, especially in hybrid or large-scale learning environments.

Recent developments in artificial intelligence have led to the emergence of automated sign language translation systems that aim to support communication between deaf and hearing participants. For example, the EU-funded Horizon 2020 project SignON (<https://signon-project.eu/>) focuses on developing a multimodal platform for translating between sign languages and spoken languages using AI technologies.

At the same time, practical tools such as AI-based captioning and sign language recognition platforms are becoming available for everyday use. These tools can support real-time or asynchronous communication by converting sign language into text or subtitles. This scenario focuses on the use of such tools in educational settings, with an emphasis on practical classroom integration and accessibility support.



2.2. Guiding to use the tool Sign Caption

SignCaption (SignSpeak platform): <https://signcaption.ai/>

SignCaption is an AI-based platform designed to automatically generate captions from sign language videos using sign language recognition (SLR) technology. The tool enables users to convert sign language into written text and subtitles, supporting communication and content accessibility for deaf and hard-of-hearing individuals.

The platform provides both manual and automatic captioning workflows. Users can upload recorded videos or work with live content, edit subtitles, and export captioned materials for further use in educational or communication contexts.

SignCaption includes additional features such as AI-based voice-over generation, automatic grammar correction, and subtitle editing tools. These features support the creation of accessible multimedia content, including lecture recordings, instructional videos, and presentations.

The tool is available via web interface and is designed to be intuitive for both educators and students.

Access and pricing model

SignCaption offers different access levels:

 Free version (SignCaption Lite):	 Paid versions (Pro / Enterprise):
limited minutes of AI captioning	automatic sign language captioning (AI-based)

manual captioning and subtitle editing	AI voice-over generation
basic video export and playback features	extended processing time
	batch processing and advanced workflows
	institutional support and custom solutions

This allows flexible use depending on course needs and institutional resources.

2 months free with annual billing

SignCaption Lite

Free

A best-in-class manual captioning experience, purpose-built for sign language.

- ✓ 5 minutes of AI captioning
- ✓ Manual captioning & subtitle editor
- ✓ Loop & repeat playback
- ✓ Export captioned videos

Ideal for international users and anyone who wants full control.
Available on desktop and mobile.

Sign up free

Most Popular

SignCaption Pro

\$19.99 / month

Automatic ASL-to-text AI captioning and AI voiceovers.

- ✓ Automatic ASL-to-text captioning
- ✓ AI voiceovers
- ✓ 60 minutes of auto-captioning per month
- ✓ Everything in Free

Optimized for American Sign Language (ASL). More sign languages coming as Pro expands.
Works on desktop and mobile.

Upgrade to AI

SignCaption Enterprise

Custom

For schools and organizations captioning ASL at scale.

- ✓ Everything in Pro
- ✓ Custom billing
- ✓ Batch processing & volume support
- ✓ Premium onboarding & support
- ✓ Custom workflows

Contact Sales

PROS - ADVANTAGES	CONS - DISADVANTAGES
Enables automatic conversion of sign language into text/subtitles	Accuracy may vary depending on sign language, video quality, and context
Supports both recorded and live content	Primarily focused on specific sign languages (e.g., ASL)
Provides intuitive interface for editing captions	Requires video input (not suitable for all real-time scenarios)
Includes AI-based enhancements (voice-over, grammar correction)	Advanced features available only in paid versions
Available in free version (low entry barrier)	Still evolving technology compared to human interpretation
Scalable for institutional use (enterprise solutions)	
Supports creation of accessible learning materials	

2.3. Practical component

For many deaf and hard of hearing students, sign language is not just a means of communication, it is their primary language. Its structure, grammar and logic differ significantly from those of written or spoken languages.

Consequently, written communication may not always enable these students to express their knowledge fully, particularly in tasks requiring explanation, reasoning or interpretation of complex concepts. Writing in a second language can increase cognitive load, reduce precision and limit the depth of responses.

Providing an option to use sign language enables students to demonstrate their understanding more naturally and effectively.

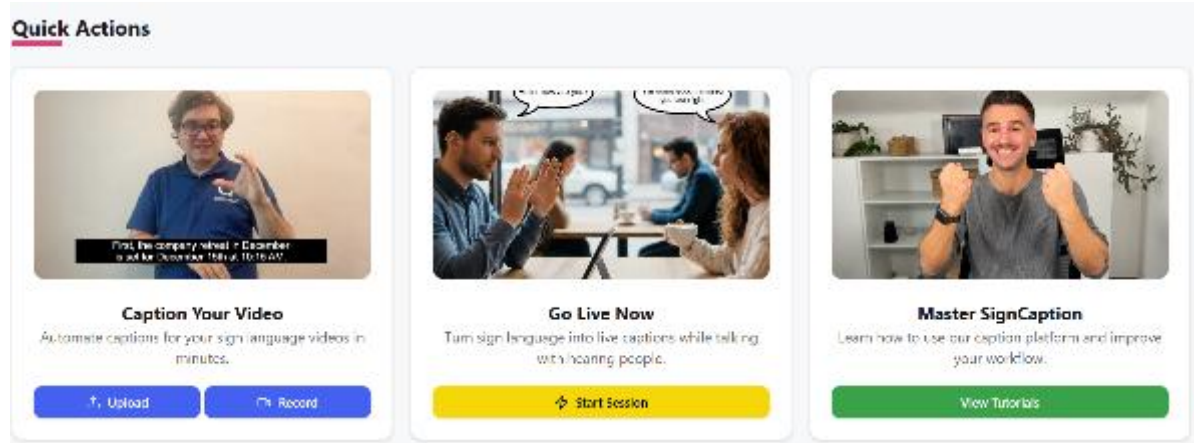
Implementation example using SignCaption: assignment-based use case

Context: University course involving conceptual or explanatory assignments

Step 1. Student prepares assignment

A student:

- records a short video response using sign language
- explains a concept, process, or solution

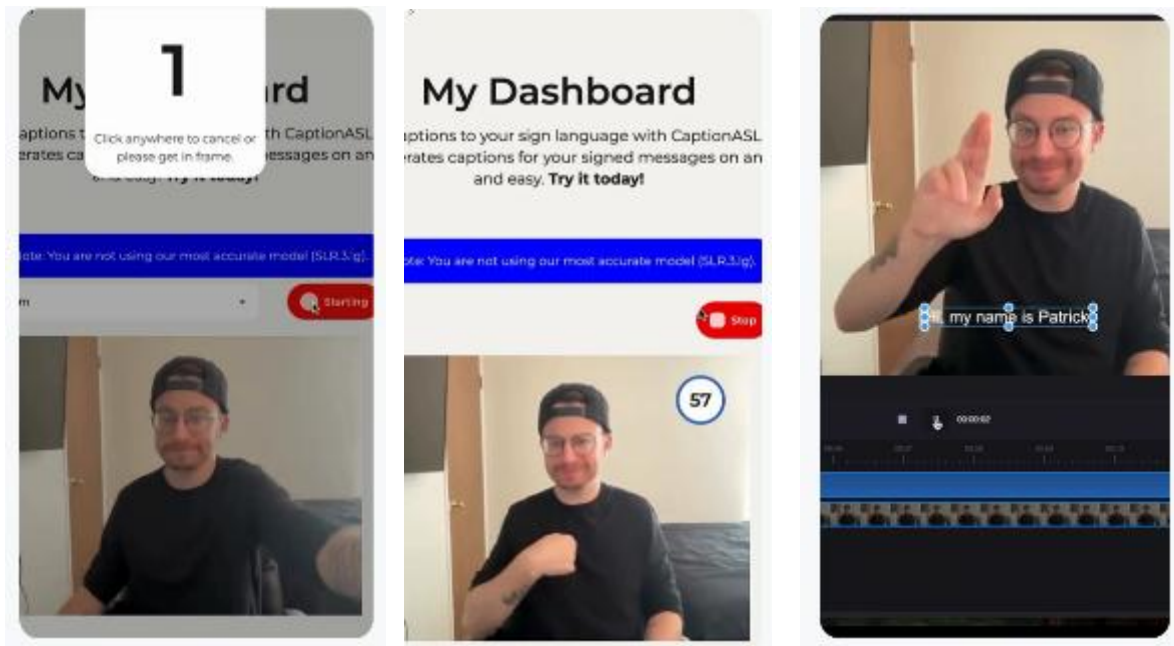


This allows the student to express ideas in their preferred communication mode

Step 2. Processing the video in SignCaption

- The student uploads the video to SignCaption
- The platform generates automatic captions (sign language → text)
- The student reviews and corrects captions if needed

A text version of the response is created



Source: <https://signcaption.ai/>

Step 3. Submission to the teacher

The student submits:

- the original video
- the generated captions

The teacher can choose how to engage with the content

Step 4. Teacher evaluation

The teacher:

- reads the captions to understand the response
- optionally reviews the video for additional clarity
- evaluates based on content and understanding

No knowledge of sign language is required

Step 5. Feedback

The teacher provides feedback:

1. in written form
2. via LMS or standard tools

The student can access feedback using assistive technologies

Example: technical course context
Course: Foundations of Embedded Systems
Task: Explain the difference between Flash and SRAM memory
The student: • provides a video explanation in sign language • uses technical concepts in a natural communication form

The system: 1. generates captions
The teacher: • evaluates the explanation based on content • provides written feedback
Supporting alternative forms of student expression, such as sign language, does not replace traditional assessment methods; it complements them. This approach enables a more inclusive and flexible evaluation, particularly for tasks that require explanation and conceptual understanding.

Recommendations for teachers

To effectively support students who use sign language in academic settings, teachers should consider the following:

1. Allow flexible formats for assignments

- Provide students with the option to submit responses as video (in sign language), where appropriate
- Use this format especially for tasks requiring explanation or reasoning

2. Focus on content, not format

- Evaluate the quality of ideas and understanding, rather than the mode of expression
- Accept that written language may not fully reflect the student's knowledge

3. Combine video and text when possible

- Encourage students to submit both video and captions (if available)
- Use captions for quick review and video for deeper understanding

4. Keep instructions clear and structured

- Provide simple, well-organised task descriptions
- Avoid ambiguity in assignment requirements

5. Be aware of tool limitations

- Automatic captioning may contain errors
- Allow for minor inaccuracies if the overall meaning is clear

6. Use this approach selectively

- Apply video-based submissions mainly for:
 - conceptual explanations
 - presentations
 - open-ended tasks
- Use traditional formats (text, tests) where they are more appropriate

Key message for teachers

Supporting sign language-based communication in assessment is not about replacing written tasks, but about providing alternative ways for students to demonstrate their knowledge more effectively.

2.4. Self-assessment questions for the module 2 Topic 2

1. A student submits a written assignment, but the explanation is very brief and lacks clarity. The teacher knows that the student primarily uses sign language. What would be the most appropriate way to support more accurate assessment of the student's knowledge?
 - a) Ask the student to rewrite the text in more detail
 - b) Ignore the limitations and grade based only on the written answer
 - c) Allow the student to provide a video explanation in sign language
 - d) Reduce the complexity of future assignments

Correct answer: C

2. Why might written responses not always reflect the full understanding of students who primarily use sign language?
 - a) Because they are less familiar with academic content
 - b) Because sign language has a different structure than written language
 - c) Because they prefer shorter answers
 - d) Because they are not motivated to write

Correct answer: B

3. A teacher wants to use SignCaption for assessing student assignments. What is a realistic limitation that should be considered?
 - a) The tool cannot process any video content
 - b) The tool fully replaces the need for human review
 - c) The accuracy of captions may vary and require correction
 - d) The tool only works with audio input

Correct answer: C

4. In which type of assignment is the use of sign language video submissions most appropriate?
 - a) Multiple-choice tests
 - b) Short factual answers
 - c) Conceptual explanations and presentations
 - d) Numerical problem-solving tasks

Correct answer: C



5. What is the primary role of the teacher when using tools like SignCaption in assessment?
- a) To rely entirely on automated translation
 - b) To replace all written assignments with video
 - c) To ensure that students can demonstrate their knowledge in accessible formats
 - d) To simplify course content

Correct answer: C

Topic 3. Image magnification software

Authors: Gerhard Fischerauer, Natalia Morkun

Duration 2 hours

3.1. Introduction of the scenario

Students with low vision may struggle when working with digital learning materials, particularly if the content includes small text, detailed diagrams or complex visual structures. Although screen readers provide access to text in audio format, many students prefer to work visually and require enlarged or enhanced content. Image magnification tools enable users to zoom in on specific parts of the screen, adjust the contrast and enhance readability, all without altering the original material.

Most operating systems include built-in magnification tools. Windows Magnifier, for example, is a widely available solution that enables users to enlarge content, follow the cursor and navigate digital environments more easily. This scenario focuses on how magnification tools can help students access visual learning materials and participate in academic activities.

3.2. Guiding to use the tool Windows Magnifier



Windows Magnifier: <https://support.microsoft.com/en-au/windows/use-magnifier-to-make-things-on-the-screen-easier-to-see-414948ba-8b1c-d3bd-8615-0e5e32204198>

Windows Magnifier is an accessibility tool built into Microsoft Windows operating systems that allows users to enlarge the content on their screen. Designed to support individuals with low vision, it makes text, images, and interface elements easier to see. Users can magnify either the entire screen or selected areas, enabling them to focus on specific content, such as documents, presentations, or diagrams. Different viewing modes are available, including full-screen, lens, and docked view, offering flexibility depending on the task.

Windows Magnifier also provides additional features such as contrast adjustment, colour inversion and cursor tracking. These functions improve readability and navigation, particularly when working with detailed or visually complex materials. The tool can be activated instantly using keyboard shortcuts, and it does not require installation, making it easily accessible in most educational environments.

Many users are unaware that magnification tools offer additional features, such as colour inversion and contrast adjustment, that can significantly improve readability:

Access and usage

Function	Key (Desktop/Laptop)
Start Magnifier	Windows key + Plus (+)
Exit Magnifier	Windows key + Esc
Zoom in/out	Windows key + Plus (+) / Minus (-)

Navigation and display modes

Function	Key (Desktop/Laptop)
Switch views (Full screen / Lens / Docked)	Ctrl + Alt + M
Move around screen	Arrow keys (when magnified)
Follow mouse pointer	enabled by default

Visual adjustments

Function	Key (Desktop/Laptop)
Invert colours	Ctrl + Alt + I
Increase contrast (system-wide)	Left Alt + Left Shift + Print Screen
Change zoom level step	via Magnifier settings

Additional useful controls

Function	Key (Desktop/Laptop)
Open Magnifier settings	Ctrl + Alt + M → Settings
Zoom centred on mouse pointer	default behaviour
Zoom centred on keyboard focus	supported

These functions help users adjust the display according to their visual needs when working with text, diagrams, and digital content.

PROS - ADVANTAGES	CONS - DISADVANTAGES
Built-in tool (no installation required)	Limited advanced features compared to specialized software
Free and widely available on Windows devices	Can reduce context visibility when zooming in
Easy to activate and use (simple keyboard shortcuts)	May require practice to navigate efficiently at high magnification
Supports different magnification modes (full screen, lens, docked)	Not all applications are equally well supported
Improves readability of text and visual elements	Primarily supports visual access (does not provide audio output)
Useful for working with diagrams, tables, and detailed content	
Compatible with other accessibility tools	

3.3. Practical component

Standard digital materials, such as slides, PDFs, diagrams, code and tables, are often hard to read due to small text, dense layouts or low contrast. Magnification tools enable students to customise visual content to suit their needs without altering the original material. This promotes independent study, reduces visual strain and improves comprehension.

Even simple adjustments such as zooming or colour inversion can significantly improve accessibility.

Implementation example using Windows Magnifier

Context: University course with visually complex materials (slides, diagrams, tables)

Step 1. Accessing learning materials

A student opens:

- lecture slides
- PDF documents
- LMS content

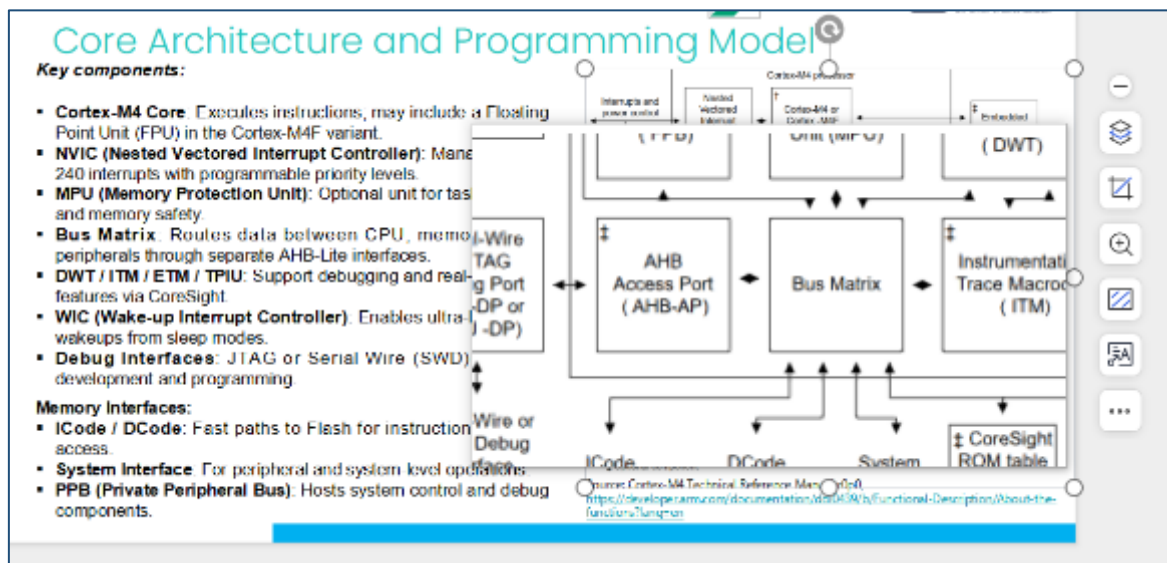
Using Magnifier:

- activates the tool (Windows key + Plus (+))
- adjusts zoom level

The student enlarges text and focuses on relevant parts of the content

Step 2. Working with structured content

Example: Lecture slides





The student:

- zooms into headings and key points
- navigates slide-by-slide
- zooms into specific parts of the diagram

Improves readability without losing structure, allows detailed exploration of visual elements

Example: Tables or code



Peripherals: GPIO, Timers, ...

STM32F412xG features and peripheral counts

- Memory tiers:** the only core difference is **Flash size**: xE = 512 KB, xG = 1 MB—while **SRAM is 256 KB on both**. Pick xG if you expect larger code or **more external data storage** is enough.
- External memory option:** parallel SRAM/PSRAM/NOVRAM and **Quad-SPI** for fast serial external code/data storage via **FSMC**.
- Timers:** you get **10 general purpose** and **2 basic** timers—simple scheduling.
- Random number generator** (useful for security/IDs).
- Communication interfaces:** full duplex, I²C 3 (+1 FMP), FS 1, CAN 2. These are the **same family**.
- Package note:** actual pin count is **48–144 pins**, smaller packages lack some peripheral signal. Always cross-check the package pinout.

The diagram shows the pinout for the STM32F412xG. It includes a table of peripheral counts and a detailed pinout diagram. The table shows that the xE version has 512 KB of Flash memory and 256 KB of SRAM, while the xG version has 1 MB of Flash memory and 256 KB of SRAM. The pinout diagram shows various peripheral pins, including GPIO, I2C, SPI, and CAN, and their functions.

E/G features and peripheral counts

The only core difference is **Flash size—x~~E~~ = 512 KB**—while **SRAM is 256 KB on both**. Pick **x~~G~~** if you need more code or libraries; otherwise **x~~E~~** is often fine.

Memory options: both variants include **FSMC PSRAM/NOR**, also usable for LCD controllers) and **fast serial Flash**, each **1×**. These let you add external storage when needed.

Both have **at least 10 general-purpose, 2 advanced-control, and 2 timers**—ample for PWM, capture/compare, and analog-to-digital conversion.

Other peripherals: **1× TRNG** on-chip (useful for secure boot), **1× I2C**, **1× SPI/I2S**, **1× UART**, **1× SDIO**, **1× USB OTG FS**.

Interfacing: **max 8 I/O pins** (all configurable as digital outputs); **max 10 interfaces (max counts): SPI/I2S 5/5** (two I2S channels), **I2C 1**, **USART 4**, **SDIO 1**, **USB 2.0 OTG FS 1**; **max 10 instances** available in total.

Peripherals		STM32F412x	
Flash memory (Kbyte)		512	
SRAM (Kbyte)	System		
FSMC memory controller(1)		-	1
Quad-SPI memory interface		-	1
Timers	General-purpose		
	Advanced-control		
	Basic		
Random number generator			
Comm.	SPI/I2S		
	I2C		
	PCF8962		
	USART	4(2)	4

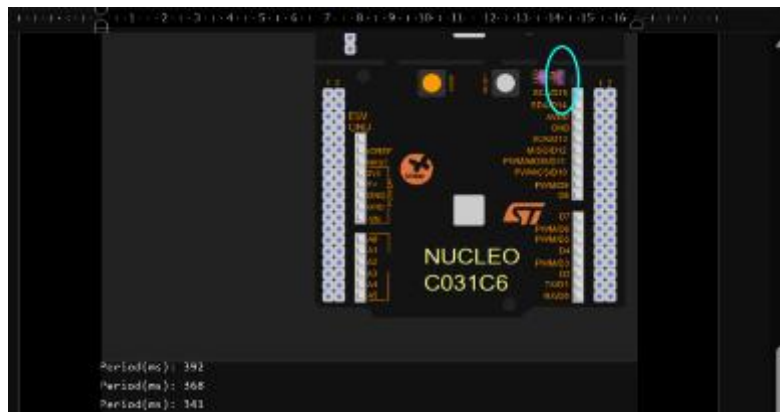
The student:

- enlarges rows or code fragments
- reads content step-by-step

Reduces visual overload and increases accuracy

Step 3. Adjusting visual settings





The student may:

1. invert colours (**Ctrl + Alt + I**)
2. increase contrast
3. adjust zoom level depending on task

Improves readability in different lighting or display conditions

Step 4. Independent study

The student:

- reviews materials after the lecture
- adjusts display dynamically

Supports longer study sessions with reduced eye strain

Example: technical course context

Course: Foundations of Embedded Systems

Task: Use in classroom

During the lecture

- Student follows slides using magnification
- Focuses on key elements without needing modified materials

During exercises

2. Works with diagrams, tables, or code using zoom
3. Adjusts view based on task

After the lecture

- Reviews materials independently
- Uses magnification for detailed reading

Typical limitations in real classrooms

- materials may not be designed for magnification
- dense slides may require frequent navigation
- high zoom levels can reduce overall context

Recommendations for teachers

1. Use clear and readable materials

- Avoid very small font sizes
- Use simple and consistent layouts
- Ensure sufficient spacing between elements

2. Structure visual content logically

- Organise slides into clear sections
- Avoid overcrowded slides with too much information
- Highlight key points explicitly

3. Support step-by-step navigation

- Present complex diagrams or tables gradually
- Explain elements in a logical sequence

4. Avoid relying only on visual detail

- Do not assume all students see the entire slide at once
- Emphasise important parts verbally

5. Share materials in advance

- Allow students to review content using magnification tools before the lecture

6. Be aware of zoom limitations

- At high magnification, students see only part of the screen
- Keep explanations clear and structured to support orientation

Key message for teachers

Magnification tools such as Windows Magnifier support visual access to learning materials without requiring significant changes in teaching content. However, their effectiveness depends on how clearly and logically information is presented.

3.4. Self-assessment questions for the module 2 Topic 3

1. A student reports difficulty reading lecture slides due to small text and dense content. They use Windows Magnifier during class.
What is the most appropriate way for the teacher to support this student?
 - a) Ask the student to sit closer to the screen
 - b) Provide slides with clearer structure and readable font size
 - c) Reduce the number of slides in the lecture
 - d) Replace slides with spoken explanations only

Correct answer: B

2. Why can high levels of magnification make it difficult for students to follow lecture materials?
- a) Because magnification reduces image quality completely
 - b) Because only a small part of the screen is visible at a time
 - c) Because Magnifier works only with text
 - d) Because students cannot control zoom levels

Correct answer: B

3. A teacher presents a complex diagram with many elements on one slide. A student using magnification tools struggles to understand it. What is the most effective teaching approach?
- a) Remove the diagram from the lecture
 - b) Present the diagram all at once without explanation
 - c) Explain the diagram step-by-step and highlight key parts
 - d) Ask the student to study it independently after class

Correct answer: C

4. In which situation is the use of magnification tools most beneficial?
- a) When students need to listen to long texts
 - b) When students prefer audio-based learning only
 - c) When working with detailed visual materials (e.g., diagrams, tables, code)
 - d) When completing multiple-choice tests

Correct answer: C

5. What is the primary role of the teacher in supporting students who use magnification tools?
- a) To replace all visual materials with audio
 - b) To ensure materials are clear, structured, and readable
 - c) To require students to use specialized software only
 - d) To simplify course content significantly

Correct answer: B

Topic 4. Audio description applications

Authors: Gerhard Fischerauer, Natalia Morkun

Duration 2 hours

4.1. Introduction of the scenario

Students with visual impairments may have difficulty accessing visual information, such as images, diagrams, printed materials or real-world objects used for teaching purposes. Screen readers provide access to digital text. However, they do not fully support the interpretation of visual content. Audio description applications address this issue by using artificial intelligence to analyse visual content and provide spoken descriptions.

Microsoft Seeing AI is one such tool that allows users to identify objects, read printed text, describe scenes and interpret visual information in real time using a mobile device. This scenario explores how audio description applications can help students interact with digital and physical learning environments.

4.2. Guiding to use the tool Microsoft Seeing AI

Microsoft Seeing AI: <https://www.seeingai.com/>



Microsoft Seeing AI is a free mobile application designed to assist people with visual impairments by providing audio descriptions of the surrounding environment. The app uses artificial intelligence and computer vision technologies to recognise text, objects, people, and scenes, and to convert this information into spoken feedback in real time.

The application includes several functional modes, such as text recognition, object identification, scene description, and document reading. These features allow users to interact with both digital and physical content, including printed materials, classroom objects, and visual elements used in teaching.

Seeing AI is available on mobile devices and is designed for everyday use, making it a practical tool for students in academic environments.

Access and usage

- Install the app from the mobile app store (iOS)
- Open the application and select the required mode
- Point the camera at the object, text, or scene
- Listen to the generated audio description

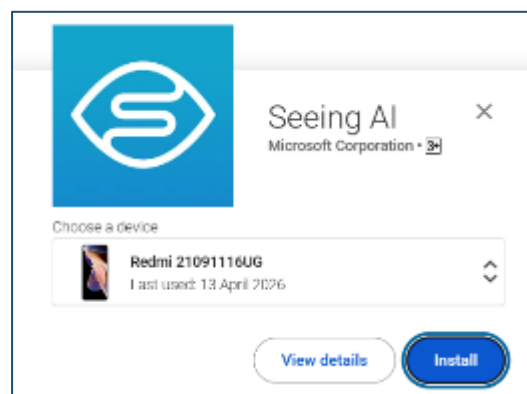
The tool works in real time and provides immediate feedback

Key features

Function	Description
Short Text mode	reads short pieces of text instantly
Document mode	scans and reads longer printed texts
Object recognition	identifies everyday objects
Scene description	describes surroundings using AI
Currency recognition	identifies banknotes
Person recognition	recognises and describes people (limited)

Access and pricing model

- **Free application** (no subscription required)
 - Available for mobile devices (primarily iOS)
- No additional cost makes it accessible for most students



PROS - ADVANTAGES	CONS - DISADVANTAGES
Free and easy to use	Available mainly on iOS devices
Provides real-time audio descriptions	Accuracy may vary depending on lighting and image quality
Supports both printed and real-world content	Limited support for highly specialised or technical content
Multiple modes for different use cases	Requires camera use (not always convenient in classroom settings)
Mobile and portable (can be used anywhere)	Does not replace detailed human explanation
Helps students interact with non-digital materials	

4.2. Practical component

Students with visual impairments often encounter difficulties when working not only with digital materials, but also with printed handouts, textbooks, or photos of lecture content. These materials are frequently used in technical disciplines and may contain dense text, diagrams, or complex formatting.

Standard assistive tools such as screen readers cannot process such content directly. Audio description applications like Seeing AI enable students to access printed or image-based information by converting it into spoken text.

This supports independent learning and reduces reliance on external assistance.

Implementation example using Microsoft Seeing AI

Context: Technical course with printed or image-based learning materials

Step 1. Accessing printed or image-based content

A student:

- receives printed materials or takes a photo of lecture content (slides, notes, textbook pages)

Topic-1:Core-Architecture-and-Programming-Model¶

The Cortex-M4 is a 32-bit processor core from Arm's M-profile, optimized for low-latency interrupt-handling and deterministic behavior.¶

- It executes a compact instruction set (Thumb-2) designed for small code size and efficient control.¶
- The STM32F412 runs Cortex-M4 at up to 100 MHz and includes optional features like an FPU and DSP instructions.¶

Registers: the CPU's working surface.¶

- **General-purpose registers:** R0-R12: used for function arguments, return values, temporary storage.¶
- **SP:** (stack pointer): points to the current top of the stack; controls local storage and call frames.¶
- **LR:** (link register): holds the return address after a function call.¶
- **PC:** (program counter): points to the current instruction.¶
- **xPSR:** (program status register): stores flags (zero, carry, etc.), execution state, and exception number.¶

- opens the Seeing AI app and selects “Document” or “Short Text” mode

This allows the student to work with non-digital content



Step 2. Capturing the content

The student:

- points the smartphone camera at the material
- adjusts the position until the text is detected

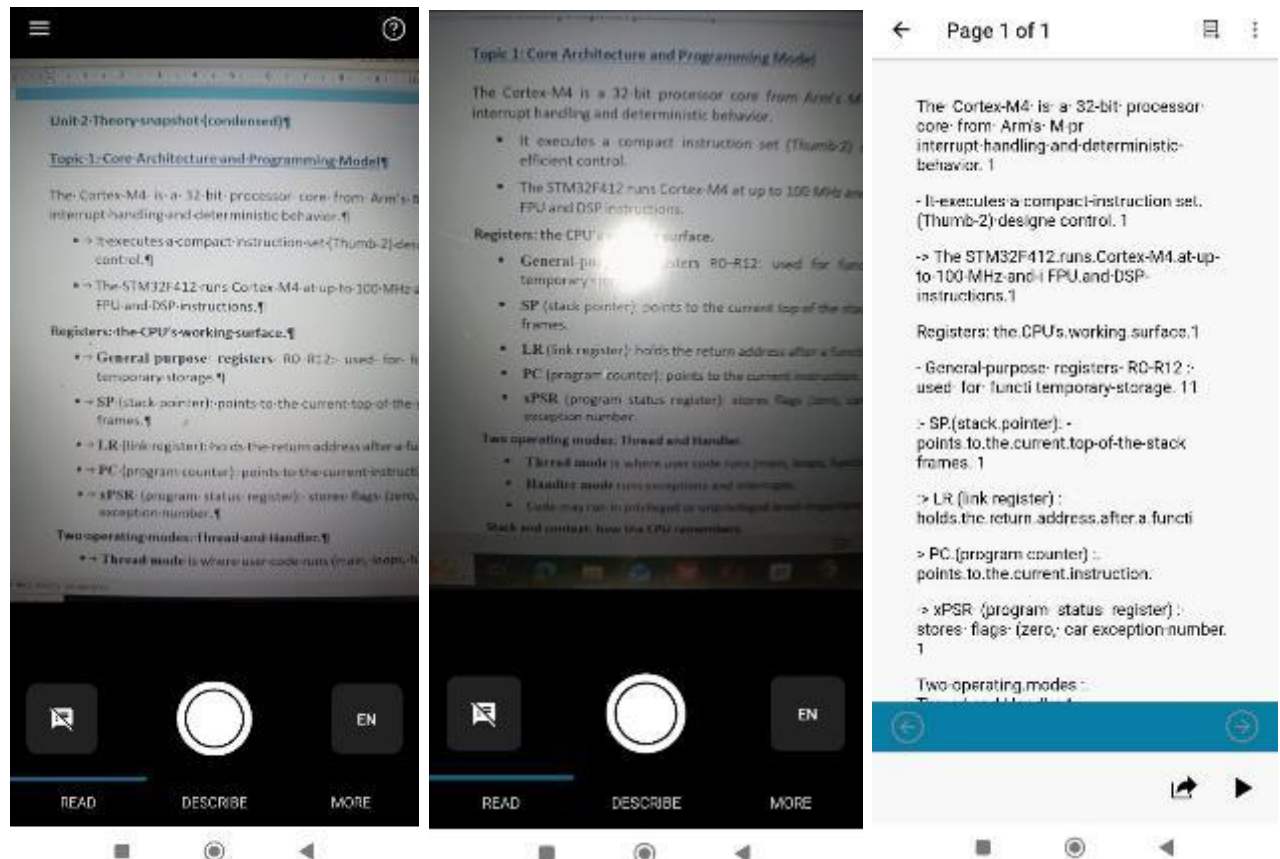
The app automatically recognises and processes the text

Step 3. Audio description and text reading

The app:

1. converts recognised text into speech
2. reads the content aloud

The student can listen to the material instead of reading visually



Observed limitations

- uneven lighting may reduce recognition accuracy
- parts of the text may be blurred or misread
- structured formatting (bullets, symbols) may not be interpreted correctly
- technical terms may be pronounced incorrectly

Students may need to repeat scanning or adjust positioning

Step 4. Independent study

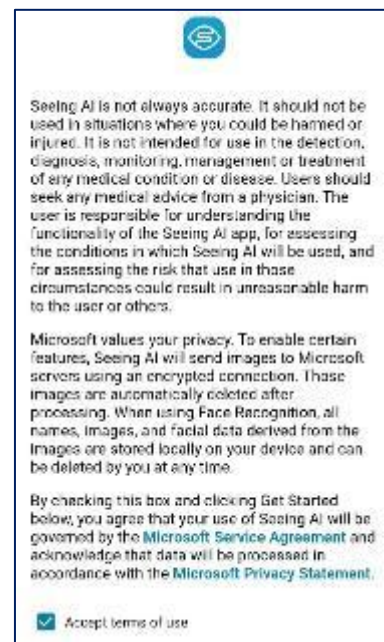
The student:

- revisits materials multiple times
- listens to specific sections again
- combines audio description with partial visual reading (if possible)

Using Seeing AI:

- scans the document
- listens to descriptions of text blocks
- repositions the camera to focus on specific sections

This allows step-by-step understanding of dense academic content and supports flexible and self-paced learning



Example: technical course context

Course: Foundations of Embedded Systems

Task: Use in classroom

During the lecture

- Student uses the app to access printed or projected materials
- Listens to key parts when visual reading is difficult

During exercises

4. Works with handouts or printed tasks
5. Uses Seeing AI to understand task descriptions

After the lecture

- Reviews photos of slides or notes
- Uses audio output for revision

Typical limitations in real classrooms

- printed materials are not always optimised for scanning
- lighting conditions vary
- camera positioning requires practice

Recommendations for teachers

1. Provide clear and readable materials

- Avoid low contrast, very small fonts, or overly dense text
- Use simple layouts that are easier to scan

2. Share digital versions when possible

- Provide slides or documents in digital format alongside printed materials
- This allows students to choose the most accessible option

3. Allow time for interaction with materials

- Students may need additional time to scan and listen to content
- Avoid rushing through visual materials

4. Do not rely only on visual information

- Explain key elements verbally during lectures
- Highlight important points clearly

5. Be aware of tool limitations

- AI recognition may not always be accurate
- Complex layouts or technical symbols may require additional clarification

Key message for teachers

Audio description applications such as Seeing AI enable students to access printed and image-based learning materials independently. However, their effectiveness depends on content clarity, environmental conditions, and the ability to combine audio feedback with structured learning strategies.

4.3. Self-assessment questions for the module 2 Topic 4

1. A student with visual impairment receives printed lecture materials with dense text and no digital version available.
What is the most appropriate way for the student to access the content independently?
 - a) Ask another student to read the material aloud
 - b) Use an audio description application such as Seeing AI
 - c) Skip the material and focus on lectures only
 - d) Wait for the teacher to explain everything

Correct answer: B

2. A teacher provides complex diagrams and visual materials during a lecture without verbal explanation.
Why can this be problematic for students using audio description tools?
 - a) The tools cannot process any visual information
 - b) The tools replace the need for explanation
 - c) Students may not fully understand visual content without additional context
 - d) The tools only work with printed text

Correct answer: C

3. A student uses Seeing AI to read printed technical material but reports occasional errors in recognition.
What is the most appropriate teacher response?
 - a) Require the student to stop using the tool
 - b) Ignore the issue
 - c) Provide additional clarification or digital materials when possible



d) Reduce the course complexity

Correct answer: C

4. In which situation is the use of audio description applications most beneficial?
- a) When working only with structured digital text
 - b) When interacting with printed materials or real-world objects
 - c) When completing multiple-choice tests
 - d) When writing short answers

Correct answer: B

5. What is the primary role of the teacher when supporting students who use tools like Seeing AI?
- a) To replace all visual materials with audio
 - b) To ensure that students can access visual content in alternative formats
 - c) To require all students to use the same tool
 - d) To simplify all course materials

Correct answer: B

Module 3. AI TOOLS SUPPORTING STUDENTS WITH MENTAL HEALTH DISABILITIES

Authors: Bożena Majerek, Anna Teler & Justyna Janik

Duration 20 hours

Introduction

The educational challenges faced by students with mental health disorders pose a significant challenge for modern higher education. Conditions such as depression, anxiety disorders, bipolar disorder, and schizophrenia spectrum disorders can significantly impact a student's ability to concentrate, their motivation to study, their ability to organize their work, and their participation in classes. Students experiencing mental health crises often struggle with reduced cognitive efficiency, difficulties in processing information, and increased stress levels, which affect their academic performance and increase the risk of dropping out (Eisenberg 2009, p. 3; Auerbach 2016, p. 5). Additionally, stigmatization and reluctance to disclose health issues in the academic environment can act as barriers, limiting access to institutional support (Gulliver 2010, p. 2).

In this context, AI-based technologies that can support the educational process for students with mental health conditions are gaining increasing importance. AI tools, such as therapeutic chatbots, adaptive learning systems, and mental well-being monitoring apps, enable the delivery of personalized educational and emotional support. Adaptive systems can adjust the pace and format of instructional content delivery to the user's current cognitive abilities, which helps maintain engagement and improve academic performance (Holmes, p. 78). Properly designed and utilized AI tools can serve as a significant complement to traditional forms of educational support, contributing to increased accessibility and inclusivity in higher education.

Topic 1. Time and task management apps

Authors: **Bożena Majerek and Anna Teler**

Duration 2 hours

1.1 Introduction of the scenario

Today's educational environment places ever-increasing demands on effective time management, task management, and maintaining focus. A particular challenge for students with mental health conditions is organizing their work in an environment with sensory overload and difficulties in initiating tasks. In response to these needs, digital tools based on artificial intelligence are being developed to support planning and task completion. One such solution is Fluidwave—a platform that combines task management features with elements of personalization and cognitive support. This tool offers both individual and team-based work

organization capabilities, and its features are designed to reduce distractions and support the development of healthy habits.

1.2. Guiding to use the tool Fluidwave

<https://fluidwave.com/>



Fluidwave (formerly OneTask) is a time and task management tool (i.e., a scheduling tool) that helps you optimize your to-do list and workflow, set priorities, delegate tasks, schedule them, and build habits. At the same time, the tool helps you stay focused while working on tasks. Fluidwave helps you manage tasks and time intelligently (based on data and personalization). The creators also emphasize that it is a mobile and desktop app designed to support people with attention deficit disorder, and that “the platform’s true innovation lies in overcoming the barriers to initiating tasks and prioritization” (from the Fluidwave website description: <https://fluidwave.com/pl/blog/adhd-productivity-apps>).

There are no system requirements; the tool is designed for both individual users and teams. There is a basic (free) version and a paid version (with premium features). The tool is available via:

- web browsers (Chrome, Safari, Edge) for sessions and dashboards
- macOS software (Apple Silicon: M1, M2, M3, and M4, as well as Intel)
- coming soon for Linux and Windows 10 and later versions

PROS - ADVANTAGES	CONS - DISADVANTAGES
A wide range of features to support various aspects of task and time management, available before logging in. You must log in to use the free features and create a personalized experience.	You must log in to use the free features and create a personalized experience.
Exercises and tasks are suggested, with the option to set relevant parameters, available before logging in.	The lack of an Android app may be discouraging, especially for European users.
The tool uses AI to personalize the user experience in terms of focus and task initiation. The presence of virtual human assistants is a key differentiator, but it is still in the testing phase.	The presence of virtual human assistants is a key differentiator, but it is still in the testing phase.
The tool is available to anyone interested; the target audience also includes professionals and creators who need flexible task visualization and have trouble initiating tasks.	Advanced AI features are available in the paid premium plan (premium features include: Analytics, Automation, Card View, Custom Priorities, Intentions, Goals, and Habits)
Many different features to support various aspects of task and time management, available before logging in.	There is currently no support for users attempting to log in from a university domain (e.g., @upjp.edu.pl)—the message explains that this is a temporary situation. Email accounts such as those on gmail.com work without any issues.
Exercises and tasks are suggested, with the option to set corresponding parameters, available before logging in.	
The tool uses AI to personalize the user experience in the context of concentration and task initiation.	
The tool can be used by anyone interested; the target audience also includes professionals and creators who need flexible task visualization and struggle with initiating high-resistance tasks.	
Fluidwave combines AI-driven organization with optional task delegation to humans, creating a unique, adaptive support system that leaves it up to the user to decide which activities they want to perform themselves or with human assistance, and which they want to automate.	

Fluidwave can be used by college students because:

1. It reduces distractions and encourages focus on specific tasks, for example, through its “deep work” and “deep learn” features.
2. It offers a wide range of features that help organize and manage tasks and time.

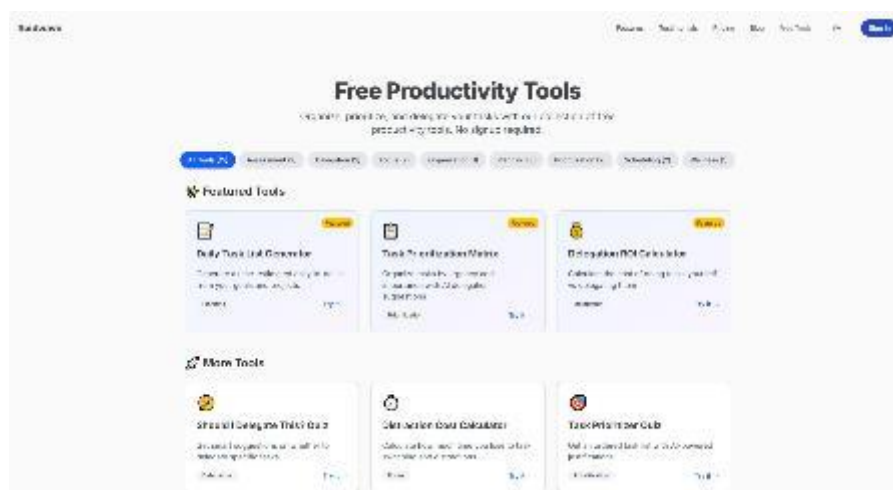
3. It provides exercises and tasks that help users develop skills in organizing work, planning tasks, and collaborating.
4. It enables task and time management at both the individual and team levels—which is useful for teamwork.
5. It adapts to the user after account creation, as tasks are completed and features are used.
6. The planned community of virtual human assistants will enable users to receive support in carrying out planned work, as well as to teach others.

On the other hand, the tool has limitations because:

- the tool is not fully available for Windows and Linux operating systems (it has been announced that it will be) or Android (and there are announcements that it will be),
- other language versions from European Union countries are missing (e.g., Lithuanian or Finnish),
- some solutions and features have yet to be introduced.

1.3. Practical component

Visit the website: <https://fluidwave.com/>. Before logging in, you can access exercises and some free features, such as: Daily Task List Generator, Task Prioritization Matrix, Should I Delegate This? Quiz, Distraction Cost Calculator, Task Prioritizer Quiz, Chronotype Productivity Planner, AI Pomodoro Timer, Procrastination Type Quiz:



The sign-up/sign-in option is located in the upper-right corner. After signing in for the first time (by entering your first name, last name, email address, and phone number), you'll be asked a series of questions about your interface preferences, language, and intended use:

Get Started
Create an account to unlock powerful productivity tools.

Apple Google

or

First name Optional Last name Optional
First name Last name

Enter your email address

Phone number Optional
PL +48 Enter your phone number

Continue

Already have an account? Sign in

Theme and Language
You can change these at any time in your profile settings.

SA DE US MK FR IN ID IT
English Czech Spanish French German Hindi Indonesian Italian Japanese Korean Polish Portuguese Russian Thai Turkish Vietnamese Urdu

Get Started

What are you working on?
Select one or more life areas.

Work Personal School Work & Personal
Creative Projects Finance Side Hustle Home Projects
Fitness Learning Business Goals Travel

Continue

Logged-in users have access to a minimalist and intuitive desktop with the option to add (in the side menu on the left): the default daily board, Intentions, Goals, Tasks, Habits, and Analytics.

fluidwave

Thursday, March 12
You carry sunshine wherever you go

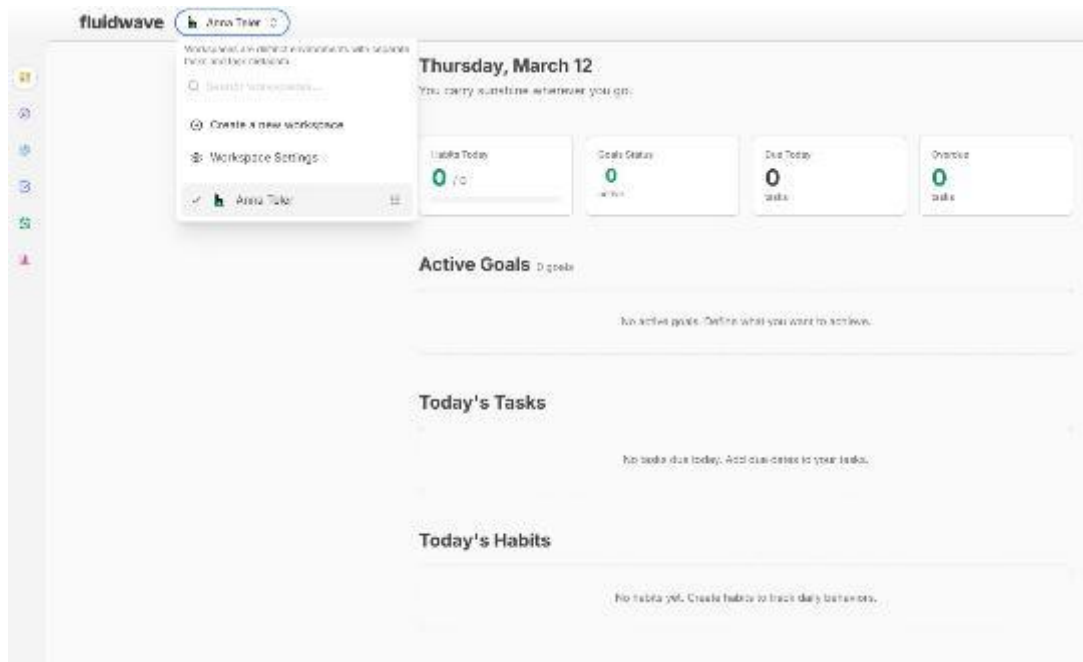
Plans today 0 / 0
Goals today 0 / 0
Tasks today 0 / 0
Habits today 0 / 0

Active Goals 0 goals
No active goals. Define what you want to achieve.

Today's Tasks
No tasks for today. Add tasks to your to-do list.

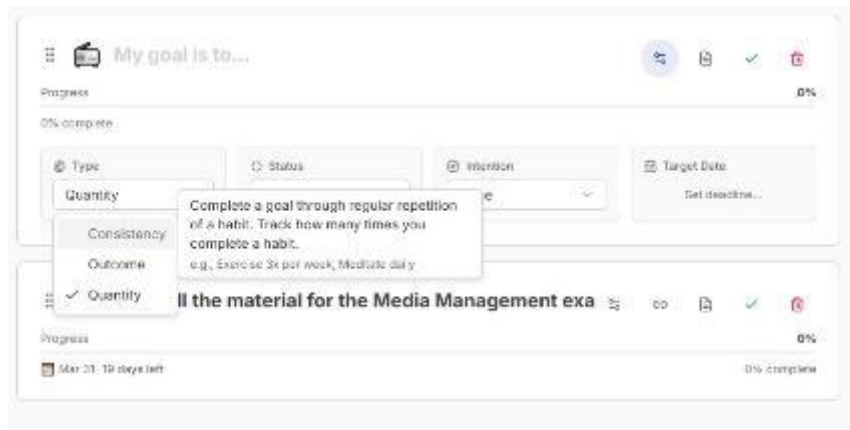
Today's Habits
No habits yet. Choose habits to track daily and build up.

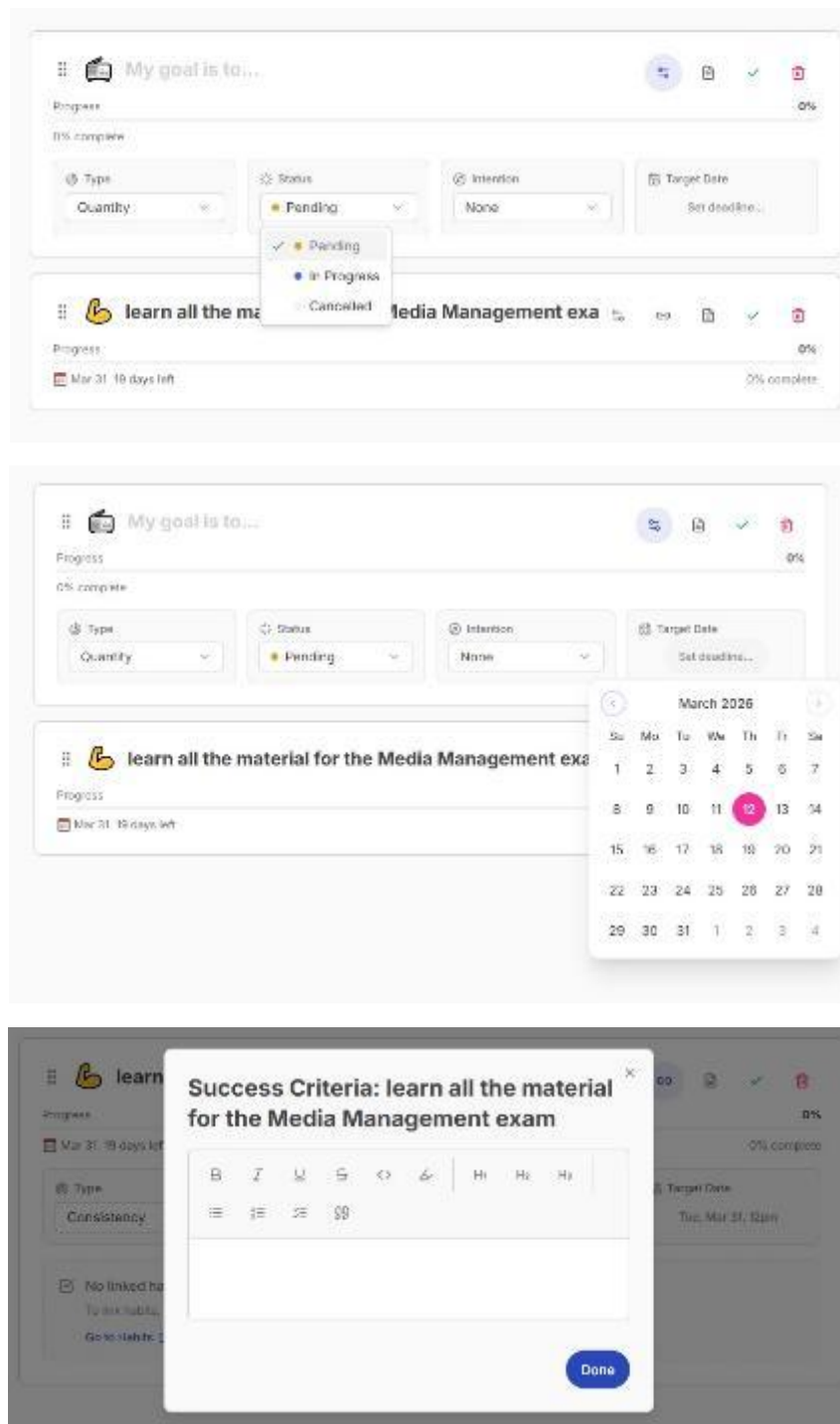
Users can create additional daily boards (workspaces) using the option located next to the tool's logo:



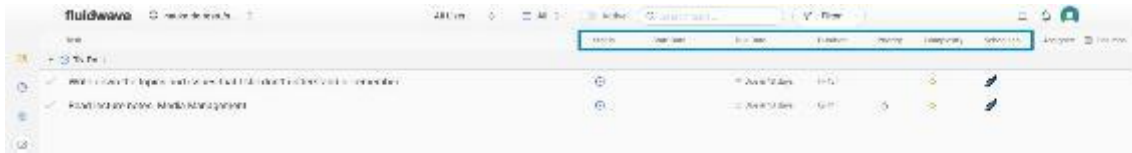
By clicking on the appropriate options in the side menu, you can add tasks, goals, or habits to work on.

- You can describe goals and specify their type, status, and completion date—as well as define the criteria for successfully achieving them.

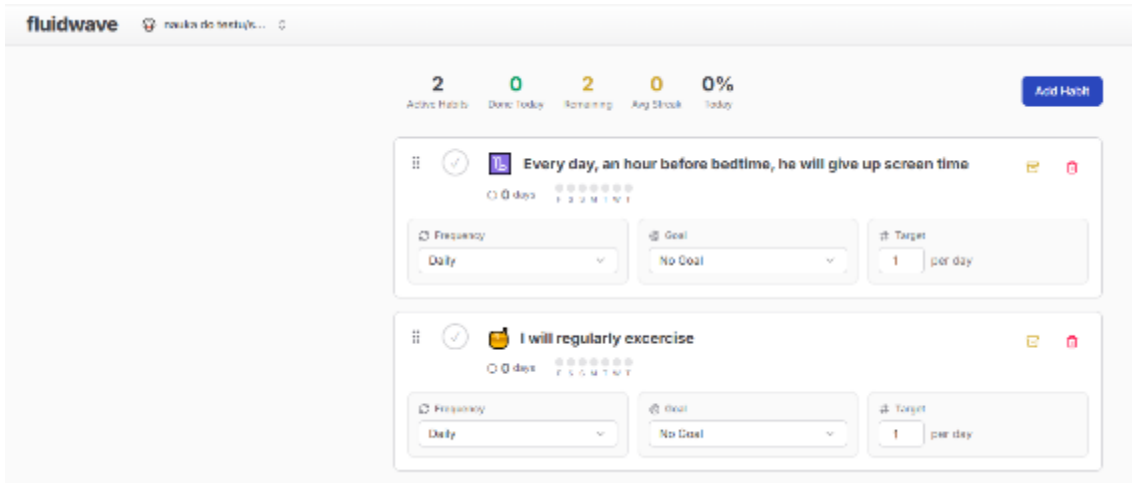




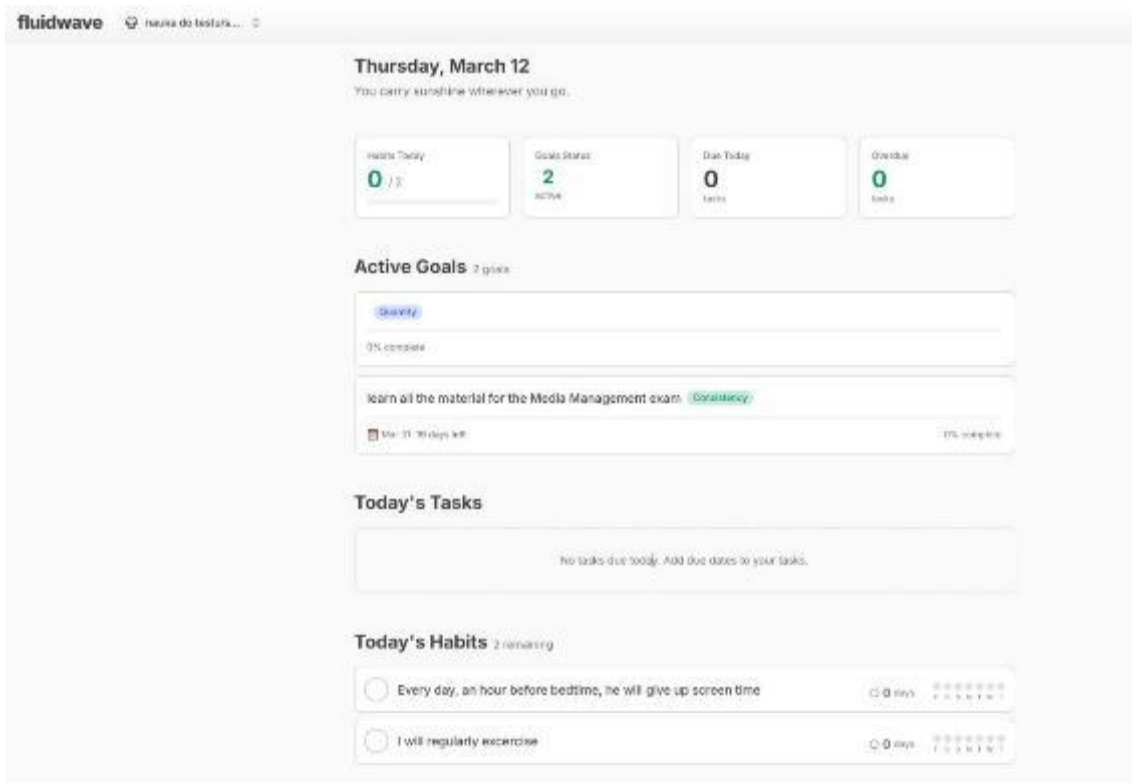
- You can add tasks by clicking the plus sign in the lower-right corner. Once named, you can link them to a goal and specify their status, start date, end date, daily duration, priority, and due date, as well as select a time slot for completion (e.g., in the evening between 6 and 10 p.m.).



- Once you've entered your habits, you can also customize them by setting the frequency, linking them to a goal, and specifying the number of times you want to perform each habit per day.



Goals, tasks, habits, and intentions should be added as needed until the daily board shows the extent to which goals are being achieved, which tasks should be prioritized, and to what extent you'll be able to develop the desired habits and establish a routine:



1.4. Self-assessment questions for the module 3 Topic 1

1. What is the main function of the Fluidwave tool in terms of managing user work?

- a) Automatic generation of scientific content
- b) Optimization of task management, time management, and workflow
- c) Creation of databases for businesses
- d) Statistical analysis of research results

Correct answer: B

2. What role does artificial intelligence play in Fluidwave's operation?

- a) It is used exclusively for automatic content translation
- b) It is responsible for the user's financial analysis
- c) It personalizes the user experience and supports concentration and task initiation
- d) It generates legal reports

Correct answer: C

3. Which of the following features is available to the user after logging into the Fluidwave system?

- a) Editing the application's source code
- b) Managing tasks, goals, and habits within the workspace
- c) Creating mobile applications
- d) Access to banking systems

Correct answer: B

4. What limitation of the Fluidwave tool was identified in the analyzed material?

- a) Inability to customize the interface
- b) Lack of support for web browsers
- c) Limited availability on certain systems (e.g., Android, Windows, Linux)
- d) Inability to work individually

Correct answer: C

5. How does Fluidwave support teamwork among users?

- a) Through the ability to conduct video conferences
- b) Through task sharing, delegation of responsibilities, and progress monitoring
- c) Through automatic evaluation of teamwork
- d) Through integration with social media

Correct answer: B

Topic 2. Platforms with Adaptive Learning Features

Authors: **Bożena Majerek and Anna Teler**

Duration 2 hours

2.1. Introduction of the scenario

The development of AI-based educational tools enables the creation of solutions that support the diverse needs of students, including those with mental health challenges. One such tool is BrainRush AI, a tutoring platform that offers personalized support throughout the learning process. The system analyzes the user's work pace, learning style, and areas of difficulty, adjusting how content is delivered and its level of complexity. A key element of the platform is the use of the Socratic method, which, through questions and prompts, supports independent problem-solving rather than providing ready-made answers. BrainRush operates in real time, generates progress reports, and offers short educational sessions tailored to attention spans. With 24/7 availability, no grading, and the ability to work with your own materials, this tool can provide significant support in organizing learning and reducing cognitive overload.

2.2. Guiding to use the tool BrainRush

BrainRush AI

BrainRush

<https://www.brainrush.ai/>

BrainRush AI is an educational tutoring tool designed to personalize and tailor the learning experience to the learner's needs. The tool integrates AI solutions to adapt to individual learning styles, aiming to make education more effective and engaging, but above all, tailored to the learner's current abilities. A key feature of BrainRush is providing 24/7 support for students, so it can be used at any time depending on the user's convenience. BrainRush serves as a reliable, accessible, and personalized digital tutoring partner for students, pupils, and parents (who can verify and identify the greatest challenges), with the goal of transforming traditional learning methods into a more adaptive, intelligent, and user-centered model.

The tool requires internet access. It does not require a download (it is not an app but a desktop platform). After a 30-day free trial, the monthly subscription cost is \$14.99, or approximately €13. Among the technical recommendations is the following: For the best experience, we recommend using a tablet or laptop with a screen size of at least 10 inches.

The tool is available via:

- web browsers including laptops, desktops, tablets, and smartphones (Chrome, Safari, Firefox, and Edge).

PROS - ADVANTAGES	CONS - DISADVANTAGES
BrainRush tracks your learning path, helps you discover answers on your own, and lets you track your progress.	No app available for download.
The tool is history-based and remembers every concept mastered, while simultaneously tracking the material the user struggles with.	Only a paid version with a 30-day trial period.
BrainRush operates in real time and generates weekly reports summarizing the material mastered. AI-generated analyses and recommendations are available.	BrainRush is aligned with the curriculum standards for elementary, secondary, and higher education across the United States. Although the content is regularly updated to meet current educational standards in the United States, it may differ from the curricula in individual European Union countries.
BrainRush uses the Socratic method: it not only provides answers, but by asking questions and offering hints, it helps students discover solutions on their own—ensuring they truly understand rather than just copying.	
BrainRush complies with the U.S. Children’s Online Privacy Protection Act (COPPA) of April 21, 2000, and additionally features a parental control option. Content and communication methods are age-appropriate, and comprehensive safety filters and parental controls have been designed for students of various ages.	
Educational sessions are designed in short series (5–15 minutes) to match individual attention spans without information overload. Each session has clear start and end points, and continuous interaction keeps the mind actively engaged.	
The tool is designed so that the user does not feel like they are being evaluated. The accompanying AI tutor patiently and non-judgmentally explains the same concepts in various ways.	
BrainRush provides 24/7 support.	

BrainRush can be used by students because:

1. When students start using BrainRush at a young age, the learning process is fully tailored to their individual profile (the app supports students from preschool through college. An AI-powered virtual tutor adapts content to each student’s knowledge level and learning pace, providing age-appropriate materials and assignments).
2. The tool is available in English, Spanish, and Portuguese (Brazilian), with plans to add more languages in the future. While absorbing educational content, students can also practice their language skills.

3. BrainRush, powered by artificial intelligence, analyzes a child's responses, learning pace, and patterns to understand their unique learning style. It then adjusts teaching methods, the level of complexity in explanations, and practical exercises accordingly. Some students need visual explanations, while others prefer detailed textual explanations.

4. Taking into account students' commitments and varying schedules, the AI tutor within the BrainRush tool is available 24 hours a day, 7 days a week.

5. BrainRush offers special licenses for schools and universities with discounts and additional features, such as: teacher dashboards, classroom management tools, curriculum adaptation reports, bulk student management, and professional development resources. As a result, it can also be used in classes by instructors or university lecturers.

On the other hand, this tool has certain limitations because:

- a) It does not yet offer many versions in European languages.
- b) Educational materials from the United States may not be fully aligned with the curricula of European Union countries, although users can upload their own materials.
- c) The lack of a mobile app may be a barrier for those accustomed to using apps.

2.3. Practical component

Visit the website: <https://www.brainrush.ai/>, and sign up by entering your first name, last name, email address, and password. You will also be asked for your age (at this stage, the tool will already tailor the content and communication style to your age).

The screenshot displays the BrainRush user interface. On the left, the 'Sign In' section features input fields for 'Email' and 'Password', a 'Remember me' checkbox, a 'Forgot Password?' link, a prominent blue 'Sign In' button, and a 'New user? Register' link. On the right, the 'Complete Your Profile' section prompts the user to 'Enter Your Birthday' with a date picker set to 'mm/dd/yyyy', a privacy notice, a grey 'Continue' button, and a 'Sign Out' link. At the bottom, three icons represent 'Adaptive Learning', '24/7 Available', and 'Progress Tracking'.

In the next window, you will be asked to select a role: parent, student, or both parent and student (you can also change this selection later in the settings).

Select Your Role

How would you like to use BrainRush?
You can always change this later in your settings

I'm a Parent

Monitor and support your child's learning

- Track your child's sessions
- View progress reports
- Monitor learning goals
- Set parental controls

Perfect for parents wanting to support their child's education

I'm a Student

Learn and explore with AI tutoring

- Personalized AI tutoring
- Practice sessions
- Progress tracking
- Subject exploration

Great for learners of all ages pursuing their educational goals

Both

Use as both student and parent

- Access to student features
- Parent dashboard access
- Switch between modes easily
- Comprehensive family learning

Ideal for parents who want to learn alongside their children

Continue with I'm a Student

You've selected: I'm a Student
Remember, you can change this anytime in your account settings

You'll also be asked about your additional interests and favorite subjects—you can skip these questions. A 30-day free trial begins as soon as you sign up, during which you don't need to provide any credit card information.

The home screen features a side menu, a search bar, the option to add a parent, change the language, and adjust other profile settings. Information about the trial period's end date appears on the home screen. You can start a new session by clicking the highlighted field.

BrainRush

[Add a Parent](#)
[in English](#)

[Dashboard](#)
[Chat](#)
[History](#)
[Settings](#)

[Sign Out](#)

Your 30-day trial expires on April 19th. Please contact us for assistance regarding full access to all features.
 [Subscribe](#)

Welcome back, Anna!

Continue Learning?

Start New Session

Start chatting and BrainRush AI will automatically identify the subject for you.

[Start New Session](#)

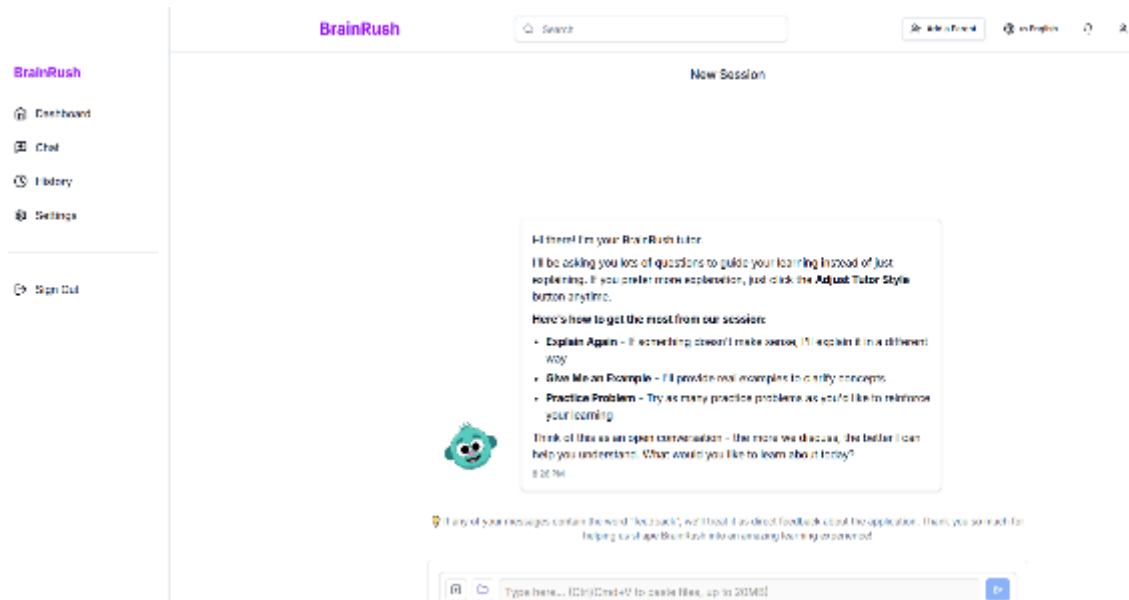
Recent Activity

No recent chat sessions yet.
Start a new session to begin learning!

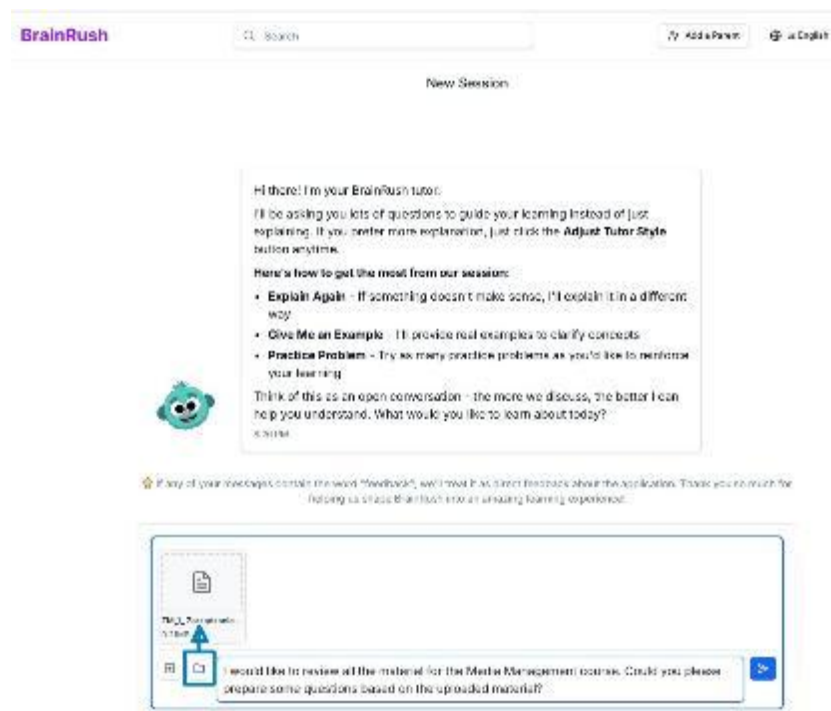
Suggested Topics

This feature is coming soon!
We're working on personalized topic recommendations just for you.

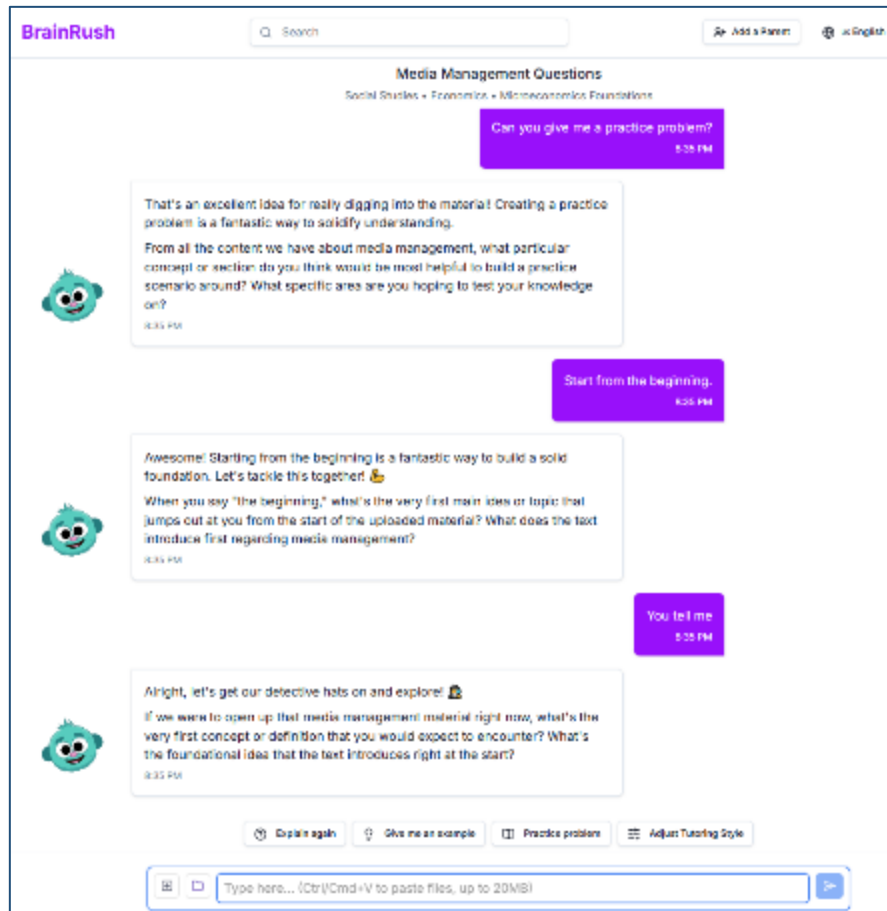
When you start a new session, a window similar to a typical AI chat appears, displaying the initial instructions and allowing you to upload up to 20 MB of your own data (such as notes or slides).



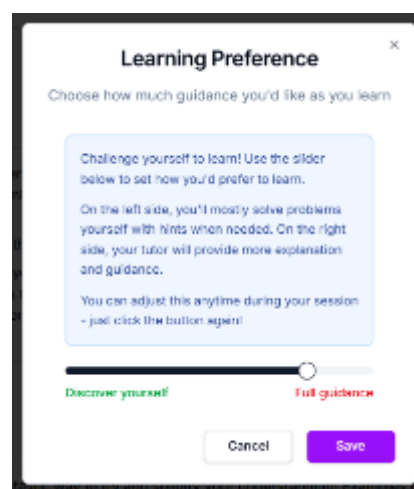
After entering a question or command and, if necessary, uploading your materials by clicking the folder icon, you can begin the learning process:



After a few instructions and clarifications on how the learning process should look, BrainRush will begin to support it:



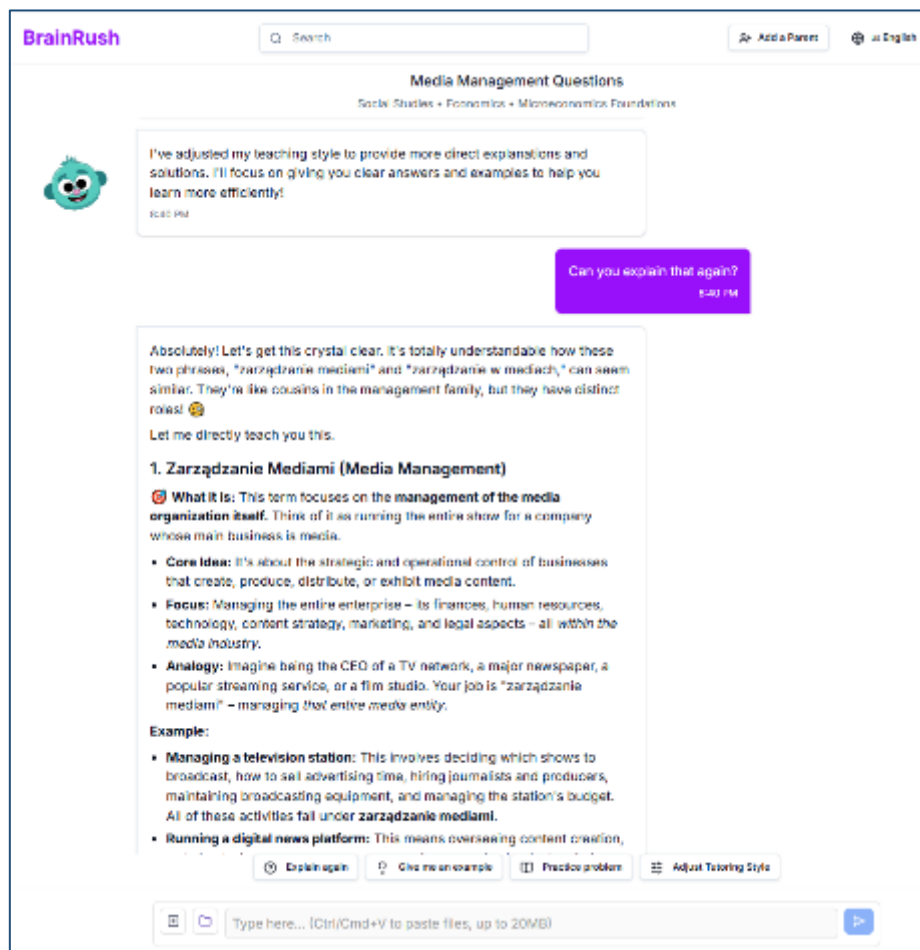
By default, the tool is set to “discover yourself” mode and will avoid providing definitions, instead asking the user to explain the topics they’ve selected on their own. After changing the settings using the “Adjust Tutoring Style” option, the tool will provide more explanations:



In the “discover yourself” section, BrainRush provides the following response to a question asking for clarification on a specific term from the provided material:



Meanwhile, after switching to a more supportive tutoring style ("full guidance"), the answer will look like this:



The tool smoothly carries out commands, such as generating a list of potential questions or a set of flashcards for learning:

The left screenshot shows a search bar at the top with the text 'Media Management Questions'. Below it, a purple box says 'Give me a list of important questions that could be asked in'. The main content area lists 'Potential Exam Questions for Media Management' and includes a section titled '1. Foundational Concepts & Definitions' with several bullet points. The right screenshot shows a 'Flashcard Set 1: Foundational Concepts & Definitions (Cards 1-10)' with a list of questions and answers. The questions are about the definition of media management, its primary focus, and examples of strategic decisions.

The tool can also suggest which learning techniques and methods are worth using to master the material:

The screenshot shows a search bar at the top with the text 'Media Management Questions'. Below it, a purple box says 'what else would you recommend as a good technique to review the material?'. The main content area features a section titled '1. The "Explain It Like I'm Five" (or "Teach It") Method' with a detailed explanation of the technique and its benefits. Below this, there is a section for '2. Mind Mapping / Concept Mapping'.

Instead of taking over the work, the instruction for BrainRush to create a mind map encourages users to make an independent effort:

The screenshot shows the BrainRush web application interface. At the top, there's a search bar and a button to 'Add a Prompt'. The main heading is 'Media Management Questions', with sub-headers 'Social Studies • Economics • Microeconomics Foundations'. A purple button says 'create for me a mind map (visual)' with a timer '0:49 PM'. Below this, a text box contains an AI-generated response: 'Absolutely! That's a fantastic idea! A mind map is a super effective way to see how all the pieces of Media Management fit together. Since I can't draw a literal picture for you, I'll create a visually structured text-based mind map using formatting, emojis, and clear hierarchy. Let's build this together! We'll start with the central idea and branch out.'

The AI-generated mind map structure is as follows:

- Media Management Mind Map**
 - This map will help you see the big picture and how all the concepts connect!
 - CENTRAL TOPIC: MEDIA MANAGEMENT**
 - This is the core of everything we're discussing!
 - Branch 1: FOUNDATIONAL CONCEPTS**
 - 1.1 Defining the Core**
 - What is Media Management?**
 - Planning, organizing, leading, controlling resources in media organizations.
 - Focus: Managing the entire media business entity.
 - Zarządzanie Mediami (Media Management)**
 - Scope: The whole organization (e.g., TV network, newspaper company).
 - Goal: Strategic and operational control of the media enterprise.
 - Zarządzanie w Mediach (Management in Media / through Media)**
 - Interpretation A: Management of a specific project/department within a media org (e.g., managing a film project).
 - Interpretation B: Using media as a tool for management by any organization (e.g., a car company using social media for branding).
 - 1.2 Unique Media Characteristics**

At the bottom of the mind map section, there are buttons: 'Explain again', 'Give me an example', 'Practice problem', and 'Adjust Tutoring Style'. Below the mind map is a text input field with a placeholder 'Type here... (Ctrl/Cmd+V to paste files, up to 20MB)' and a 'Send' button.

After a learning session ends, the material is saved in the history and appears on the main dashboard in the “Recent Activity” section, labeled by topic:

The screenshot shows the BrainRush main dashboard. On the left is a sidebar with navigation links: 'BrainRush', 'Dashboard', 'Chat', 'History', 'Help', and 'Sign Out'. The main content area has a 'Welcome back, Anna!' message and a 'Continue Learning!' button. Below this is a 'Recent Activity' section showing a card for 'Media Management Questions' with sub-headers 'Social Studies • Economics • Microeconomics Foundations' and a 'Get more info' link. At the bottom is a 'Suggested Topics' section with a placeholder for a topic card.

2.4. Self-assessment questions for the module 3 Topic 2

1. What is the main function of the BrainRush AI platform?

- a) Creating databases for educational institutions
- b) Personalizing the learning process by analyzing the user's style and progress
- c) Automatically grading student exams
- d) Generating marketing materials for universities

Correct answer: B

2. How is the Socratic method applied in BrainRush AI?

- a) Providing ready-made definitions and solutions
- b) Evaluating the correctness of the user's answers
- c) Guiding the user through questions and hints to reach independent conclusions
- d) Testing knowledge using multiple-choice quizzes

Correct answer: C

3. Which of the following best describes how educational sessions are organized in BrainRush AI?

- a) Long, multi-hour online lectures
- b) Short, intensive sessions (5–15 minutes) tailored to the user's attention span
- c) Learning exclusively in offline mode
- d) Sessions limited to a single subject

Correct answer: B

4. What limitation of the BrainRush AI platform was identified in the analysis?

- a) Lack of learning personalization options
- b) No access via a web browser
- c) Limited compatibility with curricula outside the U.S.
- d) Lack of progress tracking features

Correct answer: C

5. How does BrainRush AI support the user's learning process?

- a) By providing educational materials once
- b) By analyzing progress, generating reports, and tailoring content to the user
- c) By limiting user interaction with the system
- d) By eliminating the need for independent work

Correct answer: B

Topic 3. Automatic note-taking tools

Authors: Bożena Majerek and Anna Teler

Duration 2 hours

3.1. Introduction of the scenario

Higher education requires students not only to absorb large amounts of information, but also to organize, select, and systematically review it, which can pose a particular challenge for people with mental health conditions. Difficulties with concentration, cognitive overload, and problems with study planning affect learning effectiveness and reduce a sense of agency. In response to these needs, AI-based tools are being developed to help organize knowledge and reduce information overload. One such solution is Notta, a platform that enables the transcription of recordings, the automatic generation of summaries, and the organization of educational materials. Thanks to features such as intelligent tagging, question generation, and the conversion of content into quizzes, this tool facilitates the structuring of knowledge and supports the learning process. Its use can help reduce cognitive load and increase the accessibility of education for students experiencing mental health challenges.

3.2. Guiding to use the tool Notta

notta

[\[https://www.notta.ai/en\]](https://www.notta.ai/en)

Notta is a tool that allows you to comprehensively transcribe meeting notes and audio recordings, and then organize your notes (both written and voice-based). The tool is designed to highlight key points and the most important insights, making it useful for studying and organizing notes as well. Notta is powered by artificial intelligence, enabling users to take notes, transcribe meetings, and transform meeting conclusions into practical visualizations. Users can convert large audio files into text and create summaries of large text documents. This core feature reduces information overload and enhances convenience and efficiency while studying or taking notes, ensuring optimized learning and comprehension.

The name Notta comes from a combination of the English words “Note Taking,” meaning automatic note-taking, allowing people to effortlessly record information so they can focus on the conversation.

The tool also features automatic language translation, a search engine, and a range of AI functions that facilitate navigation and allow users to return to selected content.

The tool has no specific requirements other than that you should familiarize yourself with and adhere to the terms of service. There are 4 pricing plans available, with the most basic one being free. Additionally, there is a special plan for students and teachers, which is available at a discounted rate upon request (you must sign up with your educational email and apply a discount when making a purchase).

Notta is available via:

- a) web browsers (Chrome, Safari, Edge) for Windows and Mac
- b) Web App
- c) Mobile App for Android and iOS

As well as a Chrome browser extension.

PROS - ADVANTAGES	CONS - DISADVANTAGES
Recordings made with the consent of other meeting participants can be converted into a written transcript, which can be organized, summarized, and/or turned into a mind map.	On the free plan, the duration of a single recording is limited to 120 minutes per month; you can summarize a total of 10 minutes of audio or video footage per month using AI; and you can record 20 online meetings per month and transcribe 60 minutes of each of those meetings per month.
During teamwork, you can conduct a brainstorming session without missing any creative ideas. NinjaNotes, powered by artificial intelligence, will categorize ideas, identify recurring themes, and highlight priorities. Using the AI feature also allows you to chat with an AI agent.	Features such as: Appointment scheduling Share with password Collaborative workspace and integrations with programs like Zoom or Notion are available in paid plans.
To support the learning process, Notta will transform content into easily searchable and accessible summaries and allow you to ask questions via chat.	The free plan (which is not a trial plan) includes a lot of intrusive ads encouraging users to try the paid plans.
The tool's developers ensure that the data you share is secure and remains private, as the tool meets security standards: SOC 2 Type II certification and GDPR compliance.	
Organizing notes (both written and audio) is possible thanks to manual tagging (bookmarks) and smart folder suggestions, as well as the ability to make your own edits.	
Each option and feature, once logged in, includes instructions (tooltip hints) or has audio and/or video material available with explanations.	
You can suggest a needed feature directly to the Notta developers after logging in via the Suggest feature, and all changes are publicly visible in the so-called change log: https://www.notta.ai/en/changelog .	

This app can be used by college students because:

1. It allows users to record and transcribe information and assignments, with the option to highlight them on the main dashboard.
2. It allows you to organize collected audio notes and video materials into folders, such as folders for individual lectures or courses.
3. Recorded inspirations and ideas can be discussed with artificial intelligence to refine and improve them via chat.
4. You can (with participants' consent) record team meetings or streamline and ensure the quality of work and task distribution (by transcribing them, creating summaries, and marking the most important moments of the meeting).
5. Notes taken during lectures can be grouped into key points and summarized for easier comprehension of the material. There is also the option of interactive learning through the use of mind maps, automatically generated based on the collected material.
6. The free basic plan includes useful features such as online meeting recording, translation, transcription, summaries, and basic mind maps.
7. The developers have created a special educational plan at a discounted price for those with an email address from an educational institution.
8. The available Chrome browser extension makes it easy to take notes and comments in real time, as well as perform transcriptions and translations.

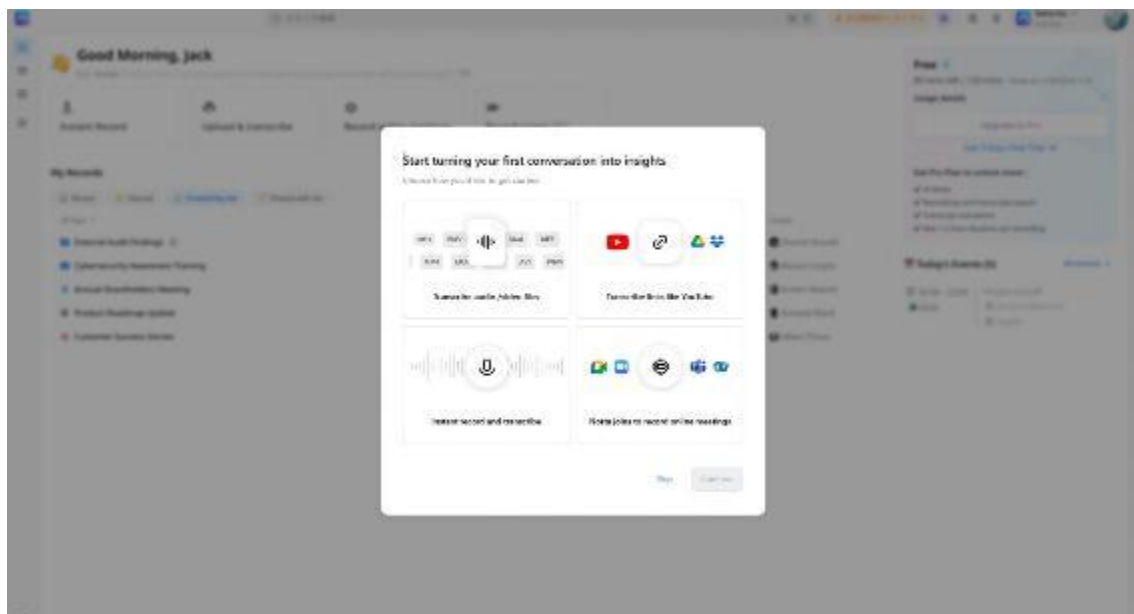
On the other hand, this tool has limitations because:

- Paid plans for using the tool include the most useful features, such as smart content search, smart question generation, integration with calendars (e.g., Google or MS Office), and support for longer audio and video files.

3.3. Practical component

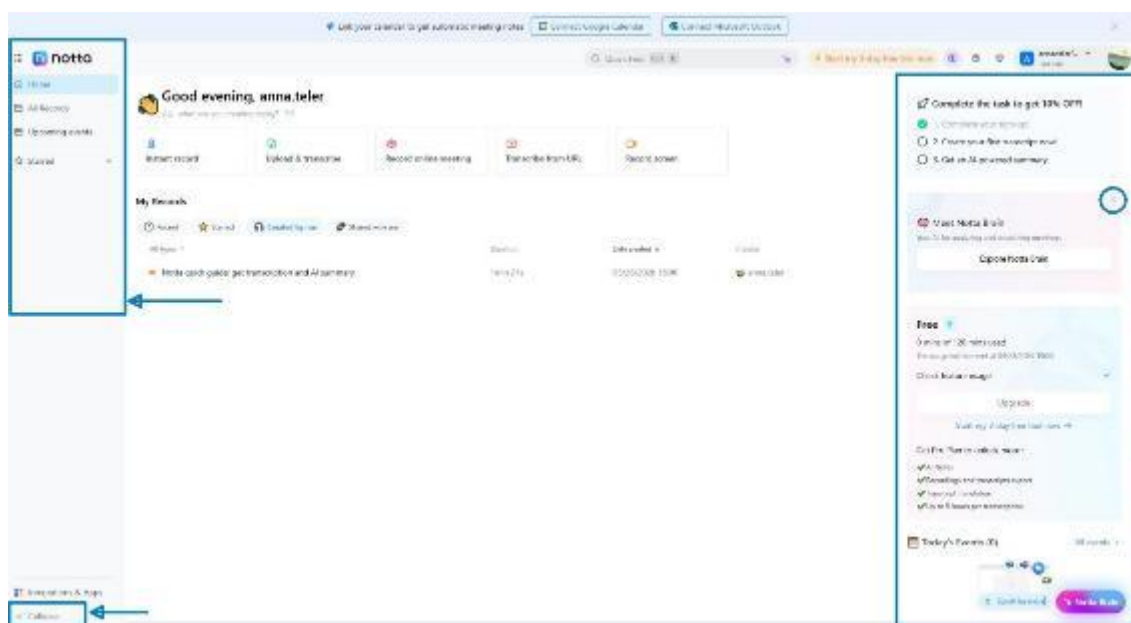
When creating an account, you must provide your email address, to which a verification code will be sent; only then can you set your account password.

After logging in for the first time, you'll be asked a few questions to personalize the service (purpose of use, tool, and context), but you can skip them.



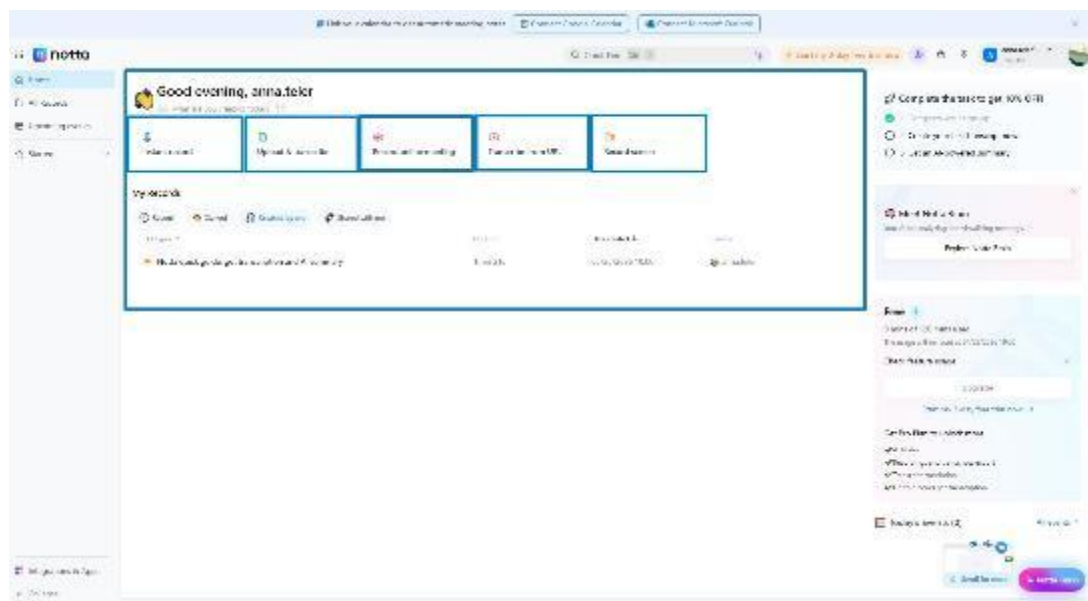
The main dashboard includes:

- a side menu on the left with access to folders containing recordings, upcoming events, and featured content (this menu can be hidden by clicking “collapse” in the lower-left corner).
- the top menu allows you to integrate with a selected calendar and search for and manage your profile
- the side menu on the right consists partly of reminders or ads, which can be removed from view.

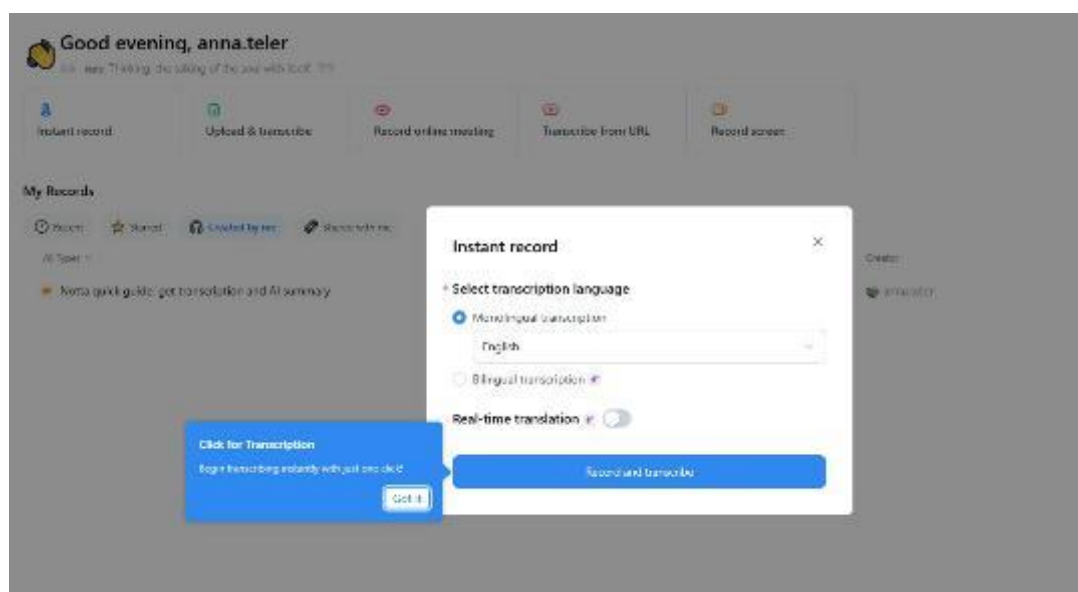


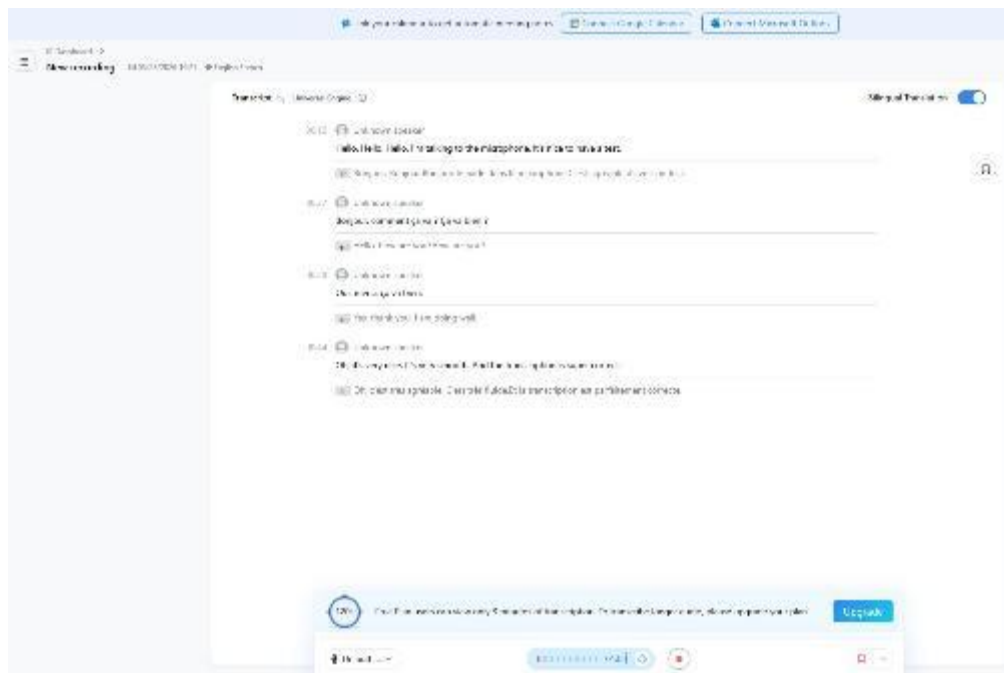
After logging in for the first time, you'll be asked questions to personalize the service (purpose of use and context), but you can skip them. On the main dashboard in the center, you can select the appropriate features.

- Instant record – record in real time
- Upload & transcribe – upload a recorded file and transcribe it
- Record online meeting – record an online meeting
- Transcribe from URL – transcribe a file available online from a selected website
- Record screen – start recording your screen.

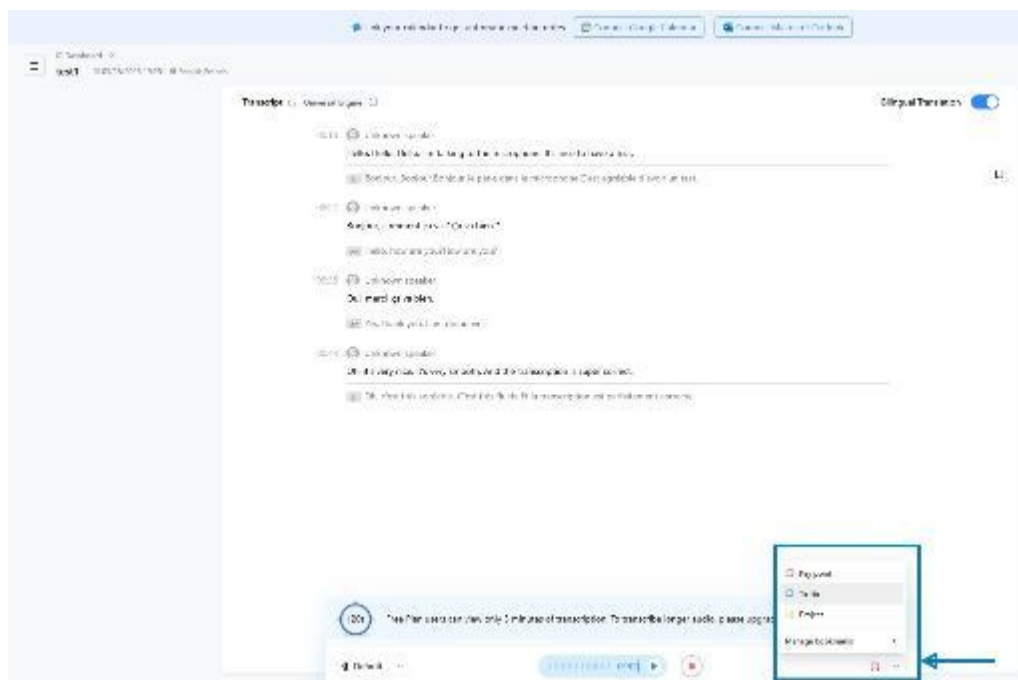


Real-time recording is available in multiple languages at once (two in the free version). And it's incredibly smooth.

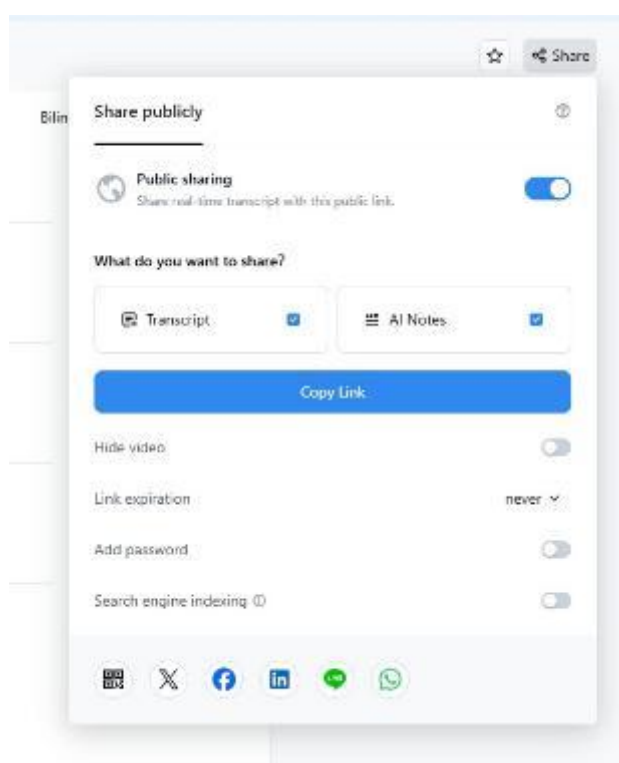




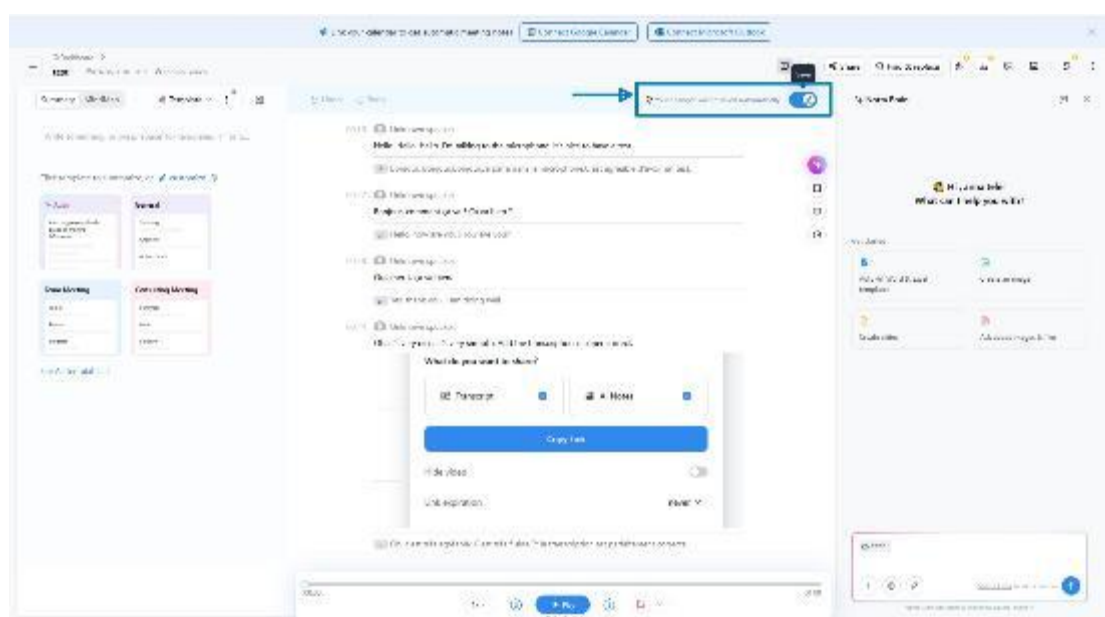
You can assign a recorded voice memo (or conversation) to the following folders: key point, to-do, project.



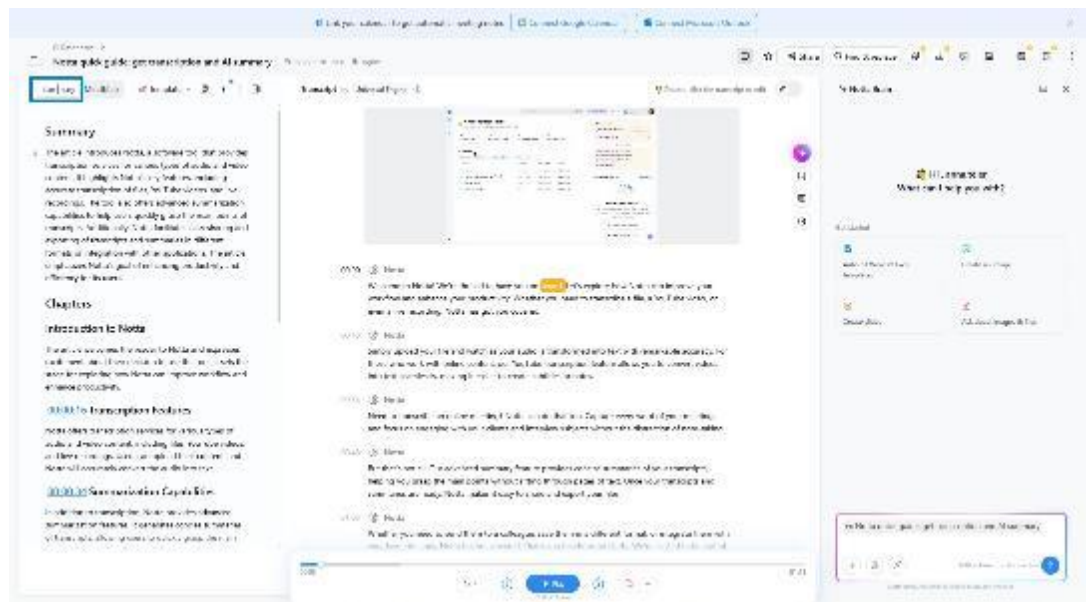
You can mark a note as featured (it will then appear in the side menu on the main dashboard on the left) or share it with someone via a link (both the audio version and the transcribed version).



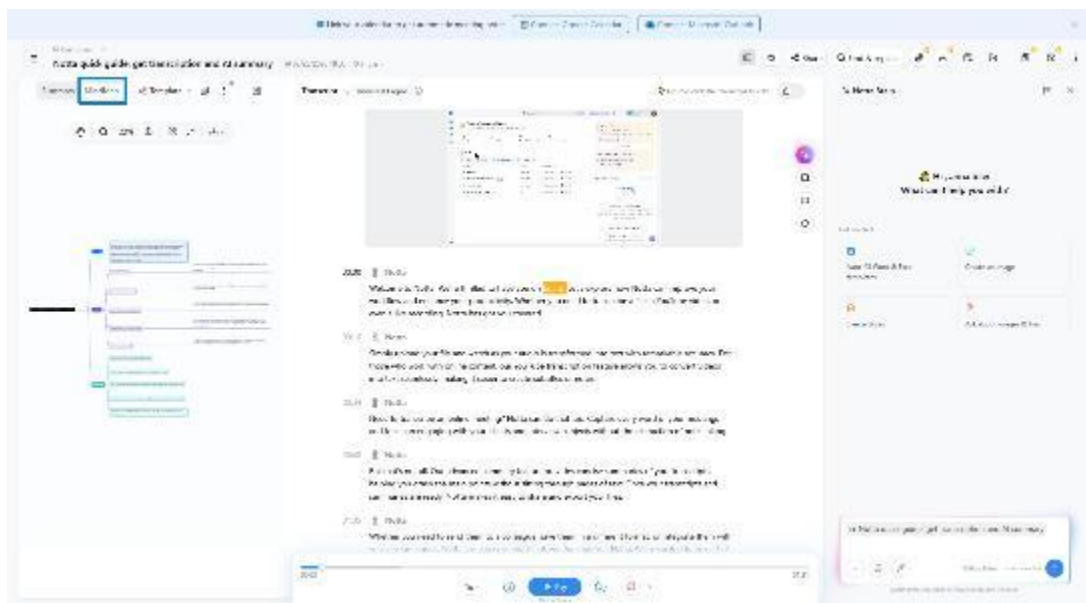
You can also make any necessary corrections to the automatically transcribed text:



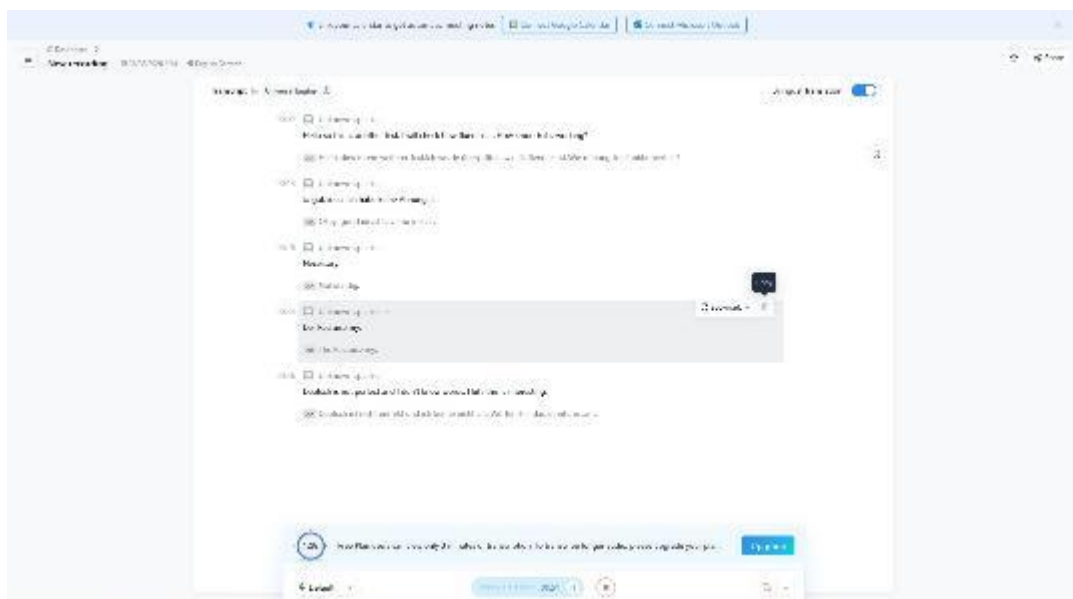
You can summarize the voice memos you've collected:



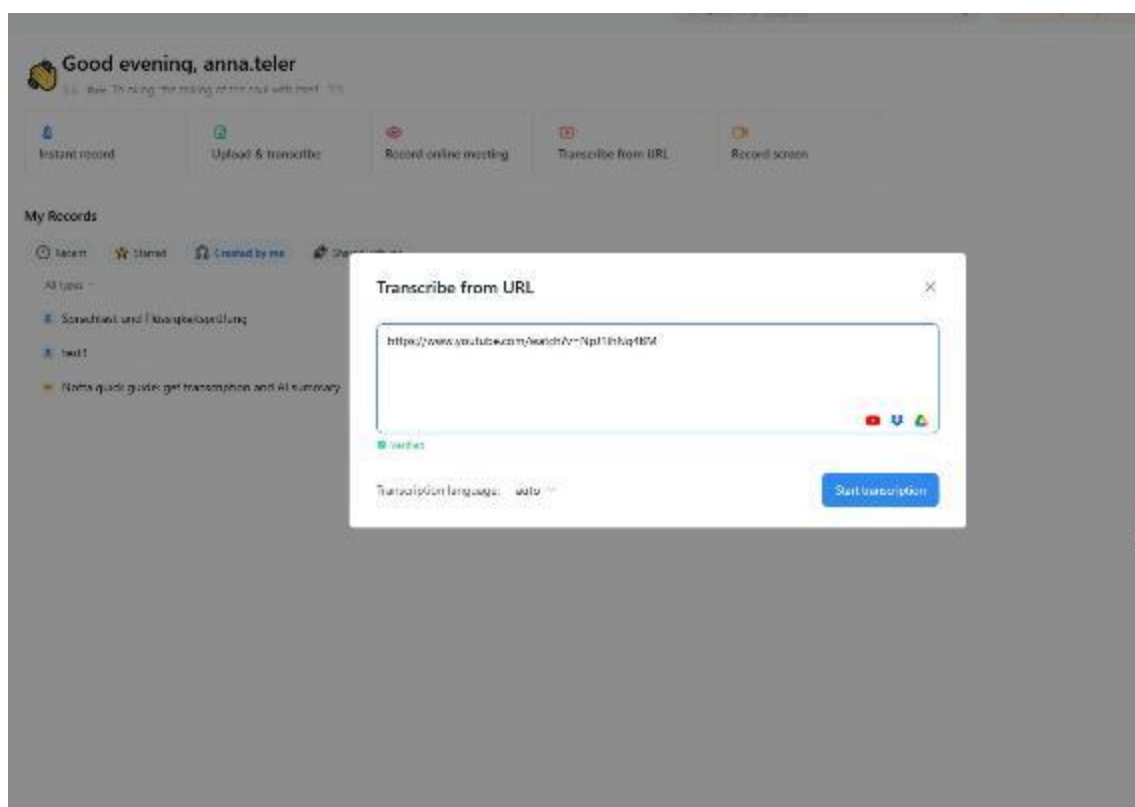
and use them to create mind maps:



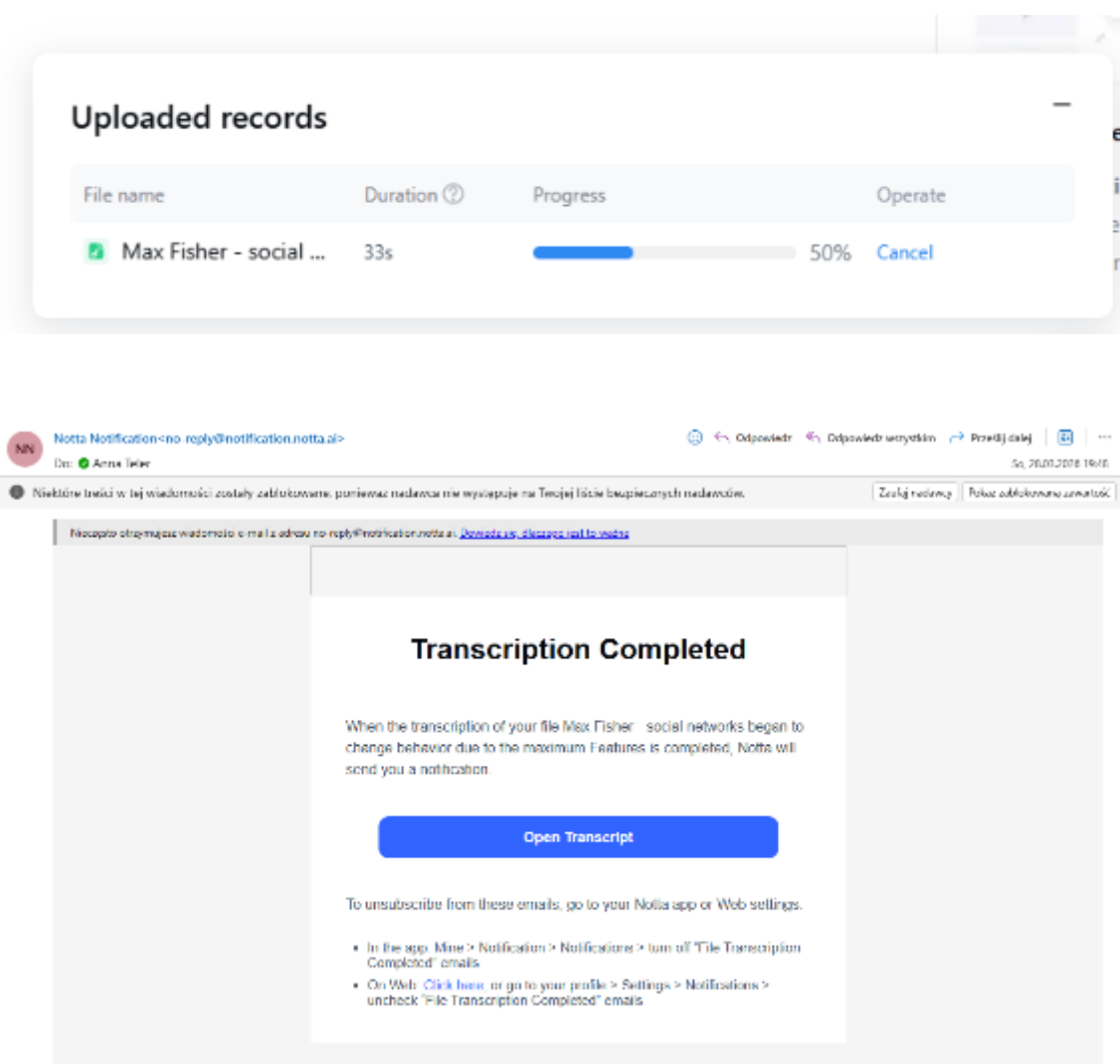
While recording notes, you can also make annotations (to mark errors or important ideas):



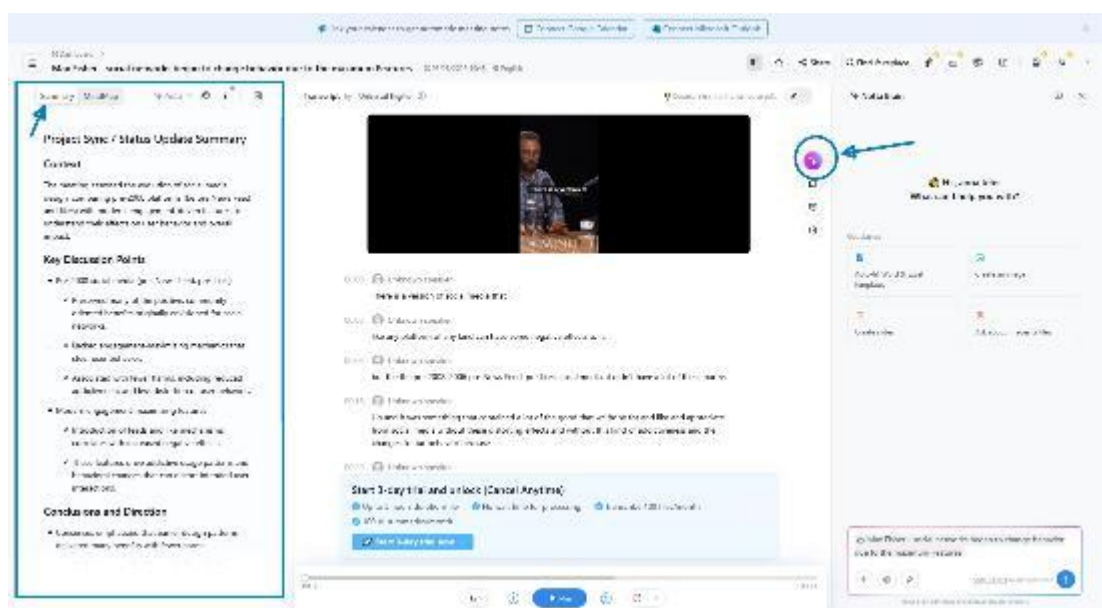
Uploading your own content and content via links is subject to certain restrictions (regarding recording length) on the free plan.



However, even short recordings are easily processed by the tool, and you can automatically generate a transcript, a summary, and a mind map. Once the upload is complete, you'll receive a notification in your email inbox.



You can summarize the uploaded content, or you can use the AI option to open a chat and start a conversation about the content:



Similarly, for online meetings that have been recorded (with the participants' consent), you can highlight key moments, create transcripts and summaries, and make mind maps.

3.4. Self-assessment questions for the module 3 Topic 3

1. What is the primary function of the Notta tool in the context of working with information?

- a) Creating multimedia presentations
- b) Automatically analyzing statistical research results
- c) Transcribing recordings and organizing and summarizing notes
- d) Generating programming code

Correct answer: C

2. How does Notta support the learning process for students?

- a) By restricting access to educational materials
- b) By transforming materials into mind maps and study guides
- c) By replacing the academic instructor
- d) By automatically grading exams

Correct answer: B

3. Which of the following features is available in Notta for working with audio and video content?

- a) Automatic creation of PowerPoint presentations
- b) Transcription of recordings and their categorization into folders and summaries
- c) Financial analysis of recording content
- d) Generation of statistical charts

Correct answer: B

4. What limitation of the Notta tool was identified in the analyzed material?

- a) Inability to work in a web browser
- b) Lack of note-organizing features
- c) Limitations regarding recording length and audio/video file size
- d) Lack of any free version

Correct answer: C

5. How can Notta support students with mental health challenges in the learning process?

- a) By increasing the number of mandatory tasks
- b) By eliminating the need to process information
- c) By reducing cognitive overload through organizing and summarizing content
- d) By replacing social interactions

Correct answer: C

Topic 4. Applications supporting everyday activities

Authors: Bożena Majerek and Anna Teler

Duration 2 hours

4.1. Introduction of the scenario

Students' academic success depends not only on acquiring knowledge, but also on the ability to organize, interpret, and transform it into coherent concepts—a process that can pose a particular challenge for individuals with mental health conditions. Difficulties in organizing thoughts, making decisions, and initiating cognitive tasks can limit the effectiveness of academic work and hinder task completion. In response to these needs, AI-based tools are being developed to support the process of structuring information and articulating it clearly. One such solution is Clarify AI, a platform that transforms vague and chaotic ideas into organized concepts by generating problem structures, questions, and examples. With features such as mind maps, a notepad, and suggestions for next steps, this tool supports the thinking and planning process. Its use can help increase the sense of control over the learning process and reduce cognitive overload.

4.2. Guiding to use the tool Clarify AI

Clarify AI

[<https://www.clarify-ai.com/>]



Clarify AI is a tool designed to help users transform vague ideas into structured concepts in just a few minutes. It aims to assist people facing challenges in expressing their thoughts. The tool works in the following steps: first, the user starts with an undefined idea, an initial thought; second, Clarify AI refines and articulates it to ensure a shared vision of the problem; third, the user receives a structure for the idea (e.g., as an organized problem tree, or a set of questions and examples), allowing them to focus on refining and crystallizing the problem; next, the user adds their own input, and Clarify AI generates context that is specific and relevant to the problem at hand; the final step is the finished form of the idea: refined and well-thought-out. The benefits of using Clarify AI include the ability to achieve clarity in minutes, effortless structuring of ideas, and a solid foundation for further research or reflection. Clarify AI's mission is to help users refine their ideas.

The tool has no requirements. It is available only in a web-based format (web browsers, e.g., Chrome, Safari, Edge) for sessions and dashboards.

PROS - ADVANTAGES	CONS - DISADVANTAGES
Simple login and a minimalist interface are among Clarify AI's key features.	The tool has a narrow scope of use.
The tool is designed to help clarify initial, often vague ideas.	The tool is web-based only and does not have a desktop application.
Clarify suggests further stages and steps for developing the idea that should be considered. It also provides	

examples that you can reject as not fitting the idea or mark as read (and fitting the idea).	
Clarify also includes a notebook where you can further discuss and refine the idea until you arrive at the final version.	

This tool can be used by college students because:

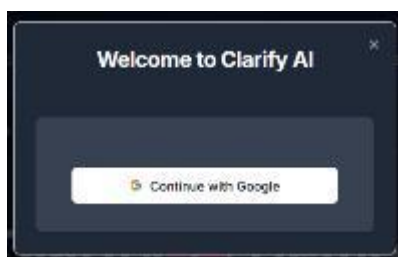
1. It is an engaging tool that supports coursework and project work.
2. It provides the necessary guidance for developing an idea and turning it into an actionable plan.
3. It can help develop entrepreneurial skills and an understanding of business conditions.
4. Among the suggestions are typical business analysis tools (e.g., SWOT or stakeholder analysis), which students can practice using their own ideas rather than pre-determined ones.

On the other hand, **this tool has limitations because:**

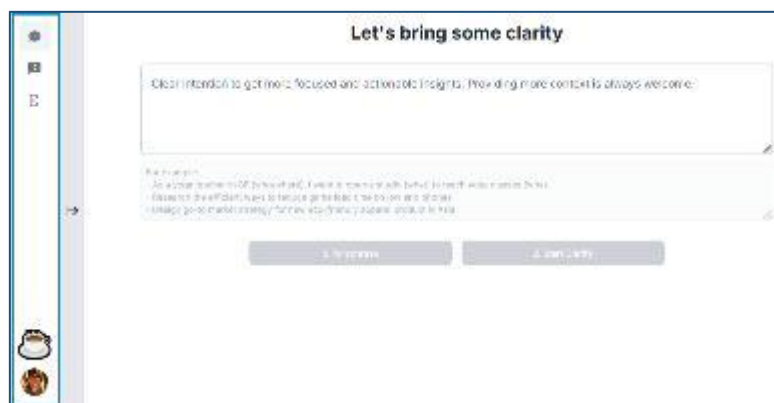
- The tool has a fairly narrow scope of application.
- There is no app available for download to use on a smartphone.
- Clarify AI is intended for individual use.

4.3 Practical component

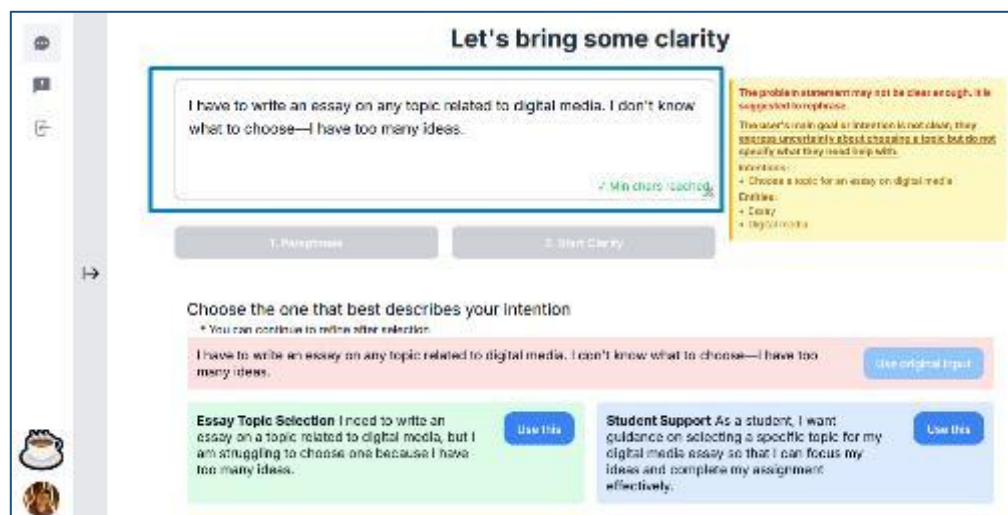
Visit: <https://www.clarify-ai.com>. In the upper-right corner, you'll find the "Sign In/Sign Up" option. Both sign-up and sign-in are handled via automatic connection to your Google account (e.g., your Gmail email address). You don't need to provide any additional information, such as your phone number, age, etc.



The side menu features minimalist options at the top: a chat window, feedback, and logout; and at the bottom: donation and the logged-in user's profile.



The tool is not designed to carry out commands, but to help clarify ideas, text, and thoughts (which is an extremely important skill when studying). If a command is entered instead of an idea to be developed, a prompt will appear indicating that the problem is not clearly defined and the user's intentions are unclear. However, even a command can be treated as an idea to be expanded upon.



Only after you enter an initial idea will Clarify AI generate several versions that focus on different perspectives, all of which could potentially be accepted. You can also use the “Use original input” option.

I want to open my business in digital media.

Clarify

Choose the one that best describes your intention

You can continue to refine after selection

I want to open my business in digital media

Use original input

Business Objective I want to open my business in digital media to establish a presence in the growing online market and reach a wider audience.

Use this

Target Audience Impact As an entrepreneur, I want to open my business in digital media so that I can provide innovative content solutions to local businesses, helping them enhance their online visibility and engagement.

Use this

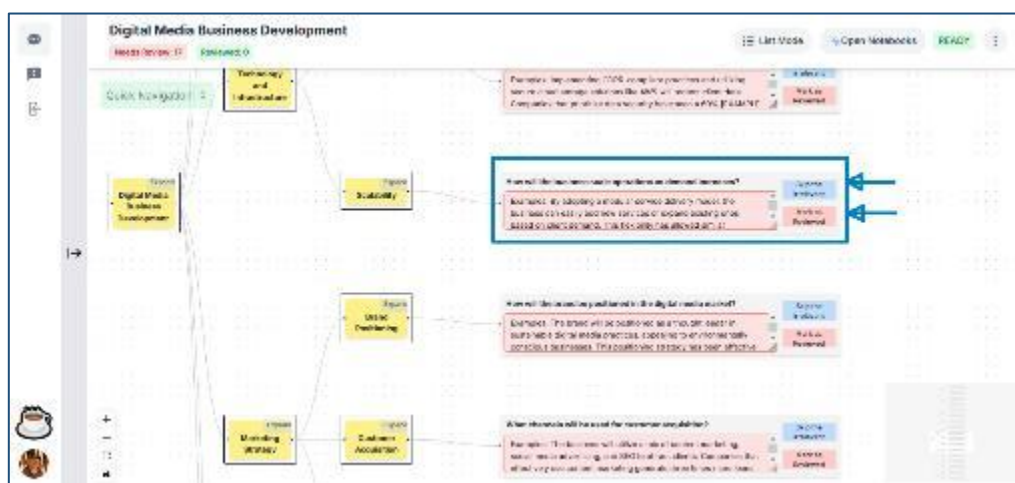
Strategic Risks As a business owner, I want to open my business in digital media to mitigate the risks associated with traditional marketing methods, ensuring that I can adapt to the rapidly changing digital landscape.

Use this

Strategic Vision As a visionary leader, I want to open my business in digital media to capitalize on emerging trends and technologies, positioning my company for future growth and sustainability in the digital.

Show more

After selecting one of the versions, you can use the Clarify option, which launches a mind map (tree mode) showing the specific elements that need to be considered in relation to the topic at hand. A number of examples appear, which you can mark as irrelevant or read.



You can open the notepad (the option is located in the upper-right corner) and continue to flesh out your idea.

Create New Notebook

☐ Draft using resolved nodes only

Select a prompt to start

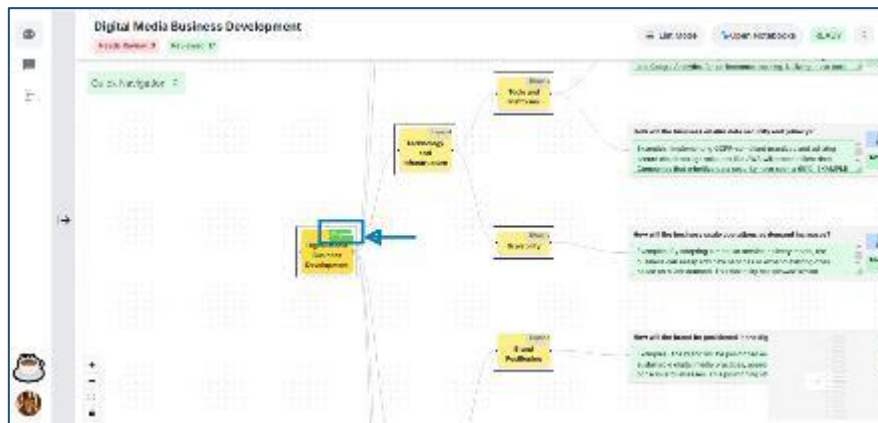
Organizations

Topics

Generate

Workflow Patterns - select from all 19 files

In a mind map, you can also expand and elaborate on subsequent steps or elements of an idea using the “extend” option:



Create subtree for: Digital Media Business Development

Original ask: I want to open my business in digital media.

OPTIONAL: specific directions, e.g.: focus more on X, ignore Y, etc.

Existing Issue tree

↓ Digital Media Business Development ← Current Selection

- Market Analysis
- Service Offerings
- Technology and Infrastructure
- Marketing Strategy
- Operational Challenges
- Success Metrics

Merge to main tree!

4.4. Self-assessment questions for the Module 3 Topic 4

1. What is the main purpose of the Clarify AI tool?

- a) Automatically generating scientific reports
- b) Transforming vague ideas into structured and developed concepts
- c) Creating databases for businesses
- d) Statistically analyzing research results

Correct answer: B

2. How does Clarify AI support the process of developing an idea?

- a) By providing ready-made solutions without user involvement
- b) By generating a problem structure, questions, and examples for further development
- c) By evaluating the quality of the user's idea
- d) By automatically publishing the results of the work

Correct answer: B

3. Which of the following features is characteristic of Clarify AI?

- a) Creating statistical charts
- b) Mind maps (tree mode) enabling idea development
- c) Mobile app development
- d) User financial management

Correct answer: B

4. What limitation of the Clarify AI tool was identified in the analysis?

- a) Inability to work in a browser
- b) Lack of idea development features
- c) Limited application and lack of a mobile app
- d) Lack of any free version

Correct answer: C

5. How can Clarify AI support students with mental health challenges?

- a) By increasing the number of mandatory assignments
- b) By eliminating the need for independent thinking
- c) By supporting the structuring of thoughts and reducing cognitive chaos
- d) By replacing contact with the teacher

Correct answer: C

MODULE 4. AI TOOLS SUPPORTING STUDENTS ON THE AUTISM SPECTRUM

Authors: Cristina Duart-Carrión, M. Pilar Ortega-Leal & Sonia Renovell-Rico

Duration: 20 hours

Introduction

Recent reviews on AI interventions for students with ASD (Adako et al., 2025; Kotsi et al., 2025) underline their educational potential and the need to explore them further. ASD is defined as a neurodevelopmental disorder with persistent social-communication difficulties and restrictive behaviors, with severity levels varying across the spectrum (APA, 2013, 2022; Volkmar & Pauls, 2018). University students with ASD face challenges in social relationships, managing change, information processing, and time management (Van Hees et al., 2015), affecting wellbeing. Recommendations include personalized support, coordinated coaching, clear communication, and psychological help. This module reviews communication, social skills, attention, and executive function difficulties, and presents AI tools and pedagogical guidelines for higher education.-communication difficulties and restrictive behaviors, with severity levels varying across the spectrum (-being. Recommendations include personalized support, coordinated coaching, clear communication, and psychological help. This -function difficulties, and presents AI tools and pedagogical guidelines for higher education.

Topic 1. Chatbots supporting social communication

Authors: Sonia Renovell-Rico, Cristina Duart-Carrión & M. Pilar Ortega-Leal

Duration 2 hours

1.1. Introduction of the scenario

Individuals with ASD show alterations in communication and social interaction, including difficulties in socio-emotional reciprocity, reduced conversational exchange, and limited sharing of interests or emotions (Paul & Wilson, 2009). They also struggle with nonverbal communication, social reinforcement, and group participation, often due to problems integrating verbal and nonverbal cues and deficits in joint attention, leading them to focus on irrelevant details (Barrios et al., 2019). Difficulties interpreting facial expressions further affect context-appropriate responses, eye contact, gestures, and Theory of Mind, limiting understanding of social cues and rules. Their needs require multimodal access to information aligned with Universal Design for Learning (CAST, 2014), offering multiple means of representation, expression, and engagement (Meyer et al., 2014). AI tools, especially multimodal and chatbot-based supports, can enhance communication and access to learning.

1.2. Guiding to use the tool Forta Health



<https://www.fortahealth.com/>

Forta Health is a 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).

Forta Health is not an open-use public app, the requirements are:

- formal ASD diagnosis,
- enrollment in Forta's ABA program,
- insurance coverage approval,
- Families apply through the Forta platform and are matched with BCBAs and virtual therapy plans.

Forta Health is a telehealth and AI platform delivered through:

- **web browsers** (Chrome, Safari, Edge) for sessions and dashboards, and
- **mobile devices** (iOS and Android) using secure video and communication tools.

Since it is a **clinical platform**, not a general m-market app, access is provided through Forta's secure portal rather than public app stores.

PROS - ADVANTAGES	CONS - DISADVANTAGES
Evidence -based ABA methodology , a widely validated intervention for ASD. Sessions are guided virtually by certified BCBAs, ensuring professional clinical support	ABA methodology is controversial among some autistic individuals. Concerns include emphasis on behaviour compliance. FORTA states it uses trauma informed, least restraint ABA, but the debate persists
Early detection & behavioural monitoring	Requires strong caregiver/teacher involvement
Social communication support , FORTA uses AI to analyse facial expressions and body language, supporting emotion recognition and improving students' response to social cues	Not universally accessible , there are some requirements. It is not an "open download" for immediate use
Development of social skills in a safe environment (simulations)	Virtual support cannot replace all face-to-face needs , which remains essential for many cases.
Personalised learning , adapts activities to the learner's cognitive style, offers immediate feedback, and uses semantic decomposition to support understanding of instructions	
Realtime-time monitoring & data-driven decisions , provides realtime-time analytics, allowing teachers and caregivers to adjust strategies efficiently	

Forta Health can be useful for Higher Education students with ASD because it offers personalised, structured support to improve their academic and daily lives.

- Enhance executive functioning, it can help them to organise themselves better, manage their time and plan tasks
- Interventions provide support for the development of social skills required for classroom participation and teamwork.
- Offers strategies for reducing stress and anxiety and for managing difficult situations on campus.
- Increase independence by teaching practical skills such as self-care and schedule organisation
- Being virtual, it is flexible and easily adapts to study schedules

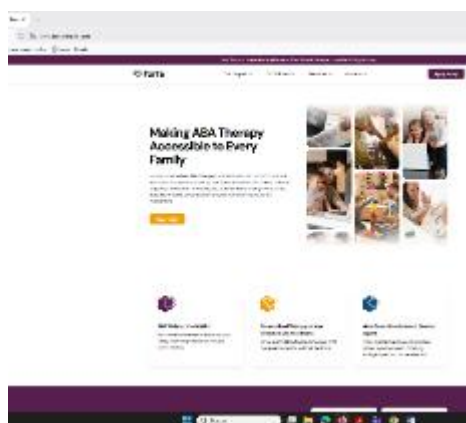
In the other hand, Forta Health limitation for Higher Education students with ASD are:

- Less focus on academic content: ABA primarily targets behavior, social skills, and daily living rather than specific college coursework or study strategies.
- May not address complex executive demanded by University (high-level planning, abstract reasoning, and self-directed learning).
- Virtual format may limit in-person support but some students require face-to-face coaching.
- Structured therapy might feel clinical. University students may prefer other models that feel more natural and less therapeutic (e.g., coaching or peer mentoring).
- Not a substitute for services offered by the institution (e.g., exam adjustments) that therapy alone does not deliver.

1.3. Practical component

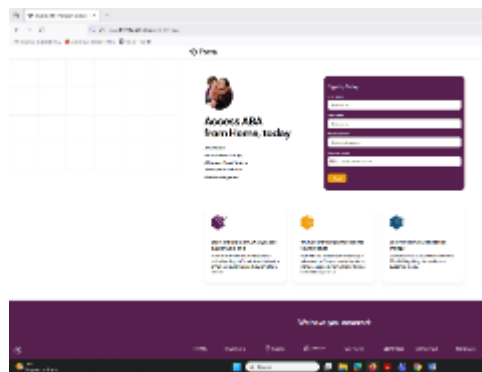
Here you have a brief tutorial in order to explain you how to use Forta Health step by step, using screenshots.

First of all, go to the website: <https://www.fortahealth.com>



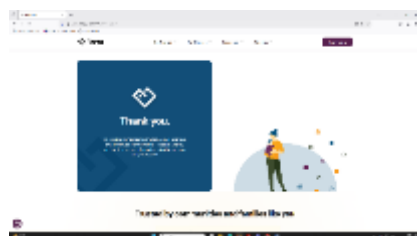
Click on the **Apply today button** (This appears in several sections of the platform).

Fill in the form with: First and last names, Email address, Telephone number, State and postcode, Medical insurance and Confirmation of ASD diagnosis



Accept the communications policy and submit the form.

- Forta will review your application and contact you within a few days if you meet the requirements to start the programme.



If you are accepted, the main panel (what you will see when you start). Although the platform may be updated, it normally contains:

- Session calendar: here you can see when your next video call with your BCBA or ABA technician is scheduled.
- Secure video call: Forta conducts sessions via an encrypted connection. You can access it by clicking 'Join session'.
- Tasks and activities: Exercises for learning social skills, communication, or behaviour management. The plan is tailored to person
- Messages and communication: Your BCBA can send you instructions, reminders, and recommendations.



What a typical session looks like. A virtual ABA session with Forta usually includes:

- Initial greeting and review of the individual's status.
- Reminder of personal goals.
- Practice of skills such as: Functional communication, Social skills, Emotional regulation, Structured play or Basic academic learning
- Positive reinforcers (praise, motivating activities).
- Final summary + instructions for the family.

This structure is based on the ABA principles that Forta applies and adapts with a trauma-informed approach and minimal use of restrictive strategies.



1.4. Self-assessment questions for the Module 4 Topic 1

1. Which factor most clearly explains why Forta Health is **not** a general-use app available in public stores like Google Play or the Apple App Store?

- a) It is still in beta and not yet fully developed
- b) It requires controlled clinical access due to its ABA-based therapeutic nature
- c) It is only compatible with iOS devices
- d) It is meant to be used only in primary school settings

Correct answer: B

2. One of the main **advantages** of Forta Health is its real-time behavioural analytics. For teachers, what is the most meaningful implication of this feature in a higher education context?

- a) It replaces all need for disability support offices
- b) It allows instructors to rely less on their own observations
- c) It supports ongoing adjustment of teaching strategies based on data-driven insights
- d) It ensures students can complete academic tasks automatically

Correct answer: C

3. Forta Health relies on Applied Behaviour Analysis (ABA). What reflective concern should teachers keep in mind when collaborating with students who use this platform?

- a) ABA guarantees identical outcomes for all ASD students



- b) ABA may be perceived as overly focused on compliance, raising ethical and student comfort considerations
- c) ABA replaces the need for any personalised learning plan
- d) ABA eliminates the need for caregiver involvement-comfort

Correct answer: B

4. Which limitation is most relevant for **university-level** students when using Forta Health as a support tool?

- a) It cannot help with anxiety or stress management
- b) It lacks tools for social communication improvement
- c) It does not directly address complex executive functions required for autonomous, abstract academic learning
- d) It cannot be used on mobile devices, only desktop computers

Correct answer: C

5. From a pedagogical standpoint, which scenario best illustrates an **appropriate** use of Forta Health in supporting an ASD student at university?

- a) Expecting Forta to replace all in-person coaching sessions
- b) Using Forta data to complement institutional accommodations (e.g., extended exam time)
- c) Requiring all students to use Forta regardless of diagnosis
- d) Substituting academic tutoring with ABA sessions

Correct answer: B

Topic 2. AI tools for personalized progress monitoring and social/communication skills support therapy

Authors: Sonia Renovell-Rico, Cristina Duart Carrión and M. Pilar Ortega-Leal

Duration 2 hours

2.1. Introduction of the scenario

People with ASD show difficulties developing and maintaining relationships, with reduced social initiative and challenges adapting to different contexts (APA, 2013, 2022). Limited awareness of implicit social norms often leads to inappropriate behaviors (Barrios et al., 2019). Social and emotional skills must be explicitly taught, from basic abilities like eye contact to more advanced ones such as conflict management (Volkmar & Wiesner, 2019). Theory of Mind and social understanding improve through social stories, emotion work, and tasks involving intentions and nonverbal cues, along with Augmentative and Alternative Communication systems (ARASAAC, 2025). Academic support requires structured, predictable environments with visual routines. Effective interventions are individualized, including Applied Behavior Analysis and technology-based approaches (March Míguez et al., 2018). Access to multimodal communication and adapted materials is essential (Barrios et al., 2019), and AI can help address these needs.

2.2. Guiding to use the tool Wysa

<https://www.wysa.com/>



Wysa is a mental health application that combines AI and therapeutic practices to help people cope with emotional and wellness issues. It offers personalised and anonymous emotional support using Cognitive-Behavioural Therapy (CBT), Dialectical Behavioural Therapy (DBT) and mindfulness. It provides tools for managing stress, tracking mood and guided practices, with optional human coaching.

Wysa is open for public use worldwide, offering:

- A free version with limited tools.
- A premium self-care plan (annual subscription).
- Optional paid human coaching sessions.

Wysa is available on:

- iOS (Apple App Store)
- Android (Google Play Store)
- It can also be accessed through a web browser interface in some implementations.

PROS - ADVANTAGES	CONS - DISADVANTAGES
User-friendly, intuitive interface — easy to navigate and welcoming for beginners.	AI responses can feel limited, repetitive, or scripted, and may not always understand user context.

Anonymous and secure, reducing stigma and encouraging honest emotional expression.	Most content locked behind a paid subscription, with limited free features.
24/7 AI emotional support, offering CBT-based tools, mindfulness, breathing exercises, and journaling.	Coaching is text-based only, which may feel insufficient for users needing richer human interaction.
Optional human coaching available for more personalized guidance.	Experience varies between Apple and Android, including pricing differences
Clinically validated, with over 45 studies supporting improvements in anxiety and depression scales.	

Wysa can be useful for ASD students for different reasons:

- Offers safety, anonymously and text-based communication. Many autistic students prefer written communication because it reduces social pressure and processing demands. Wysa offers a confidential, 24/7 text-based chatbot that provides emotional support and self-care tools.
- Gives support for emotional processing and self-regulation. ASD students often experience overload, anxiety, or difficulty managing emotions. Wysa could help them identify emotions and practice self-regulation, because it includes:
 - CBT-based emotional tools:
 - breathing exercises
 - grounding strategies
 - journaling
 - mindfulness
- Present predictable and structured interactions. Wysa's chatbot follows a structured and consistent conversational style, which can be more comfortable for students who struggle with spontaneous or ambiguous social interactions.
- Human coach support is optional: Students who want more personalized guidance, **Wysa** offers text-based professional coaching sessions.

Wysa also have some limitations for ASD students:

- The AI responses can feel rigid or confusing: Wysa's chatbot may give generic or repetitive answers, and sometimes fails to interpret context correctly. This can be frustrating for autistic users who need precise, literal responses
- It is not designed for autism specific communication needs
- Does not replace a clinical or specialized ASD support (therapist)
- Some useful content needs a subscription

2.3. Practical component

Here you have a brief tutorial in order to explain you how to use Wysa step by step, using screenshots.

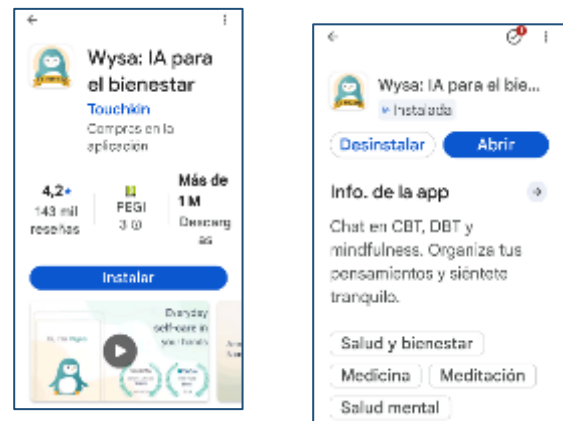
First of all, you must download the app:

On ANDROID (Google Play):

- Open Google play store
- Type WYSA into the search bar
- Tap install
- Wait for it to finish and tap Open

On iPhone (App Store):

- Open the App Store.
- Search for WYSA: Anxiety, therapy chatbot.
- Tap Get.
- Open the app when it finishes.



When you open WYSA for the first time:

- A welcome message will appear and demand you type a nickname. You must accept the terms and conditions
- On the next screen the app question about your age, in order to offer a better service.

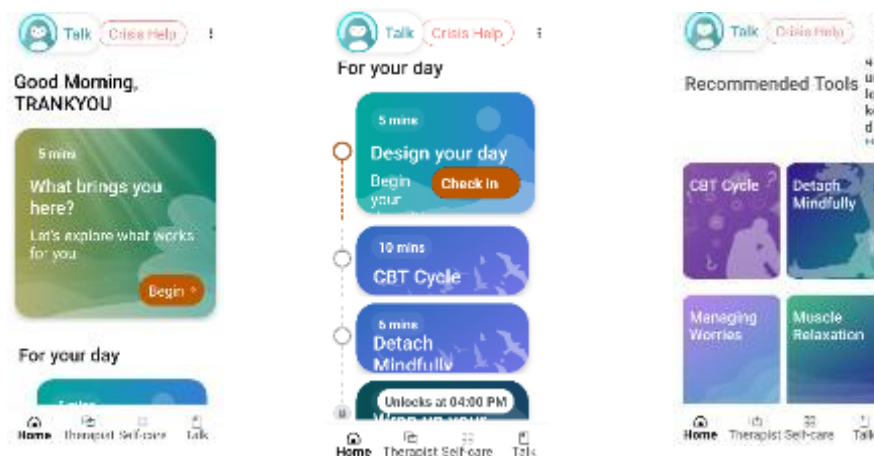


- The application will ask you to choose your language (if available).
- Building your space: It will ask you how you would like it to work with you (challenges): emotional support, stress, anxiety, sleep or social relationships. You can choose one or more.
- Adding to your space: It will demand you choose the best style for you: self-care (work on your own, filling exercises) or guided support.



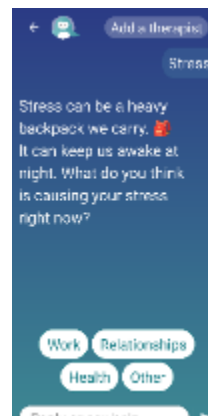
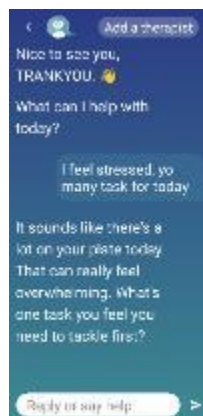
On the main screen you will find:

- At the top of the screen you will find: the chat with WYSA (Talk), the crisis help button and additional information (with settings, for example).
- In the centre of the screen: a welcome message, your personalised daily work plan, and some recommended tools for working on the topics you want to work on and/or are suggested to you.
- In the bottom some buttons: home (pantalla actual), therapist, self-care and talk



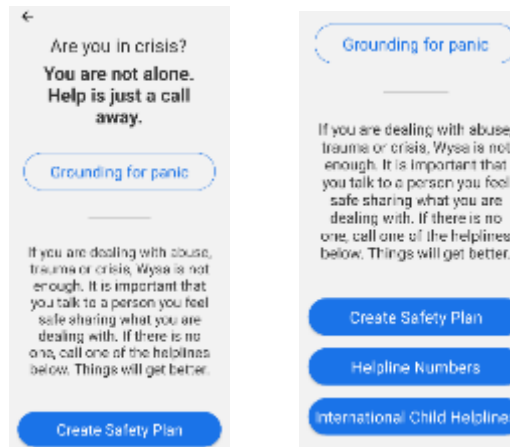
To use WYSA chat:

- Click on Talk or tap the penguin.
- WYSA will write something like: 'How are you feeling today?'
- Choose an answer from the list or write whatever you want.
- WYSA will guide you with open-ended questions, such as:
 - 'What happened today?'
 - 'Let's try a breathing exercise.'
- If you don't know what to write, you can click on the suggested options.
- WYSA will write something like: 'How are you feeling today?'
- Choose an answer from the list or write whatever you want.
- WYSA will guide you with open-ended questions, such as:
 - 'What happened today?'
 - 'Let's try a breathing exercise.'



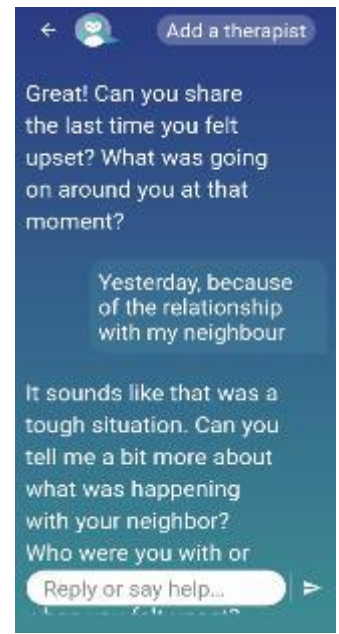
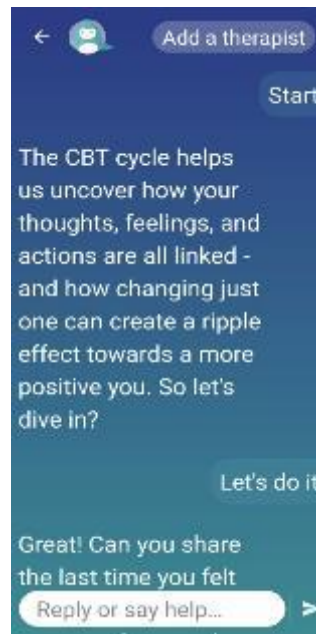
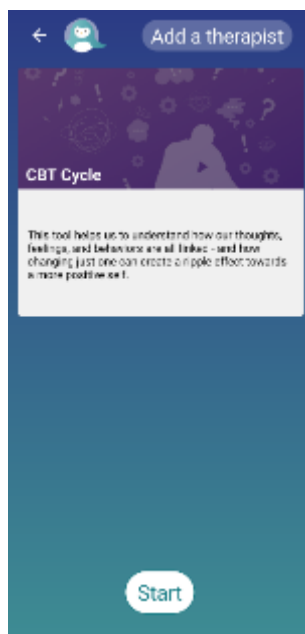
To use CRISIS HELP:

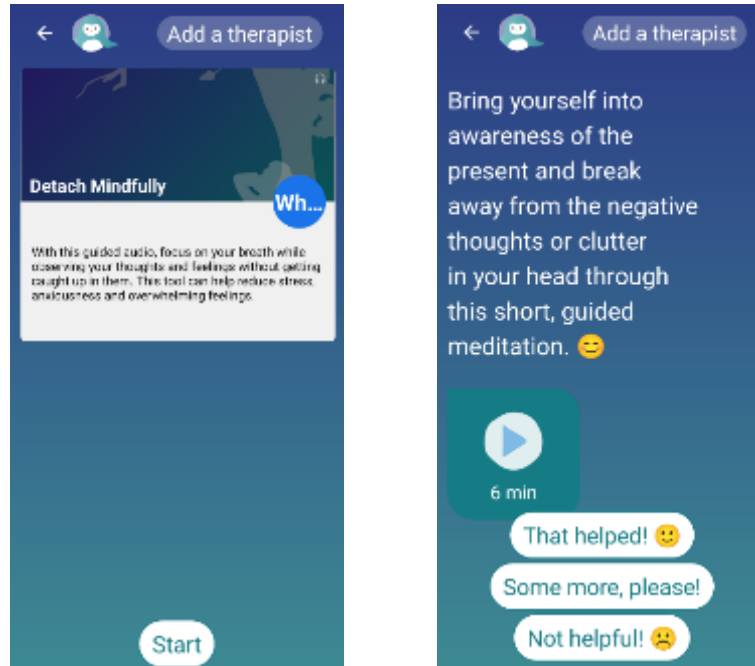
- Click on crisis help button
- Next screen will be this
- Select the most accurate option for you and your situation



To use FOR YOUR DAY (personal planning):

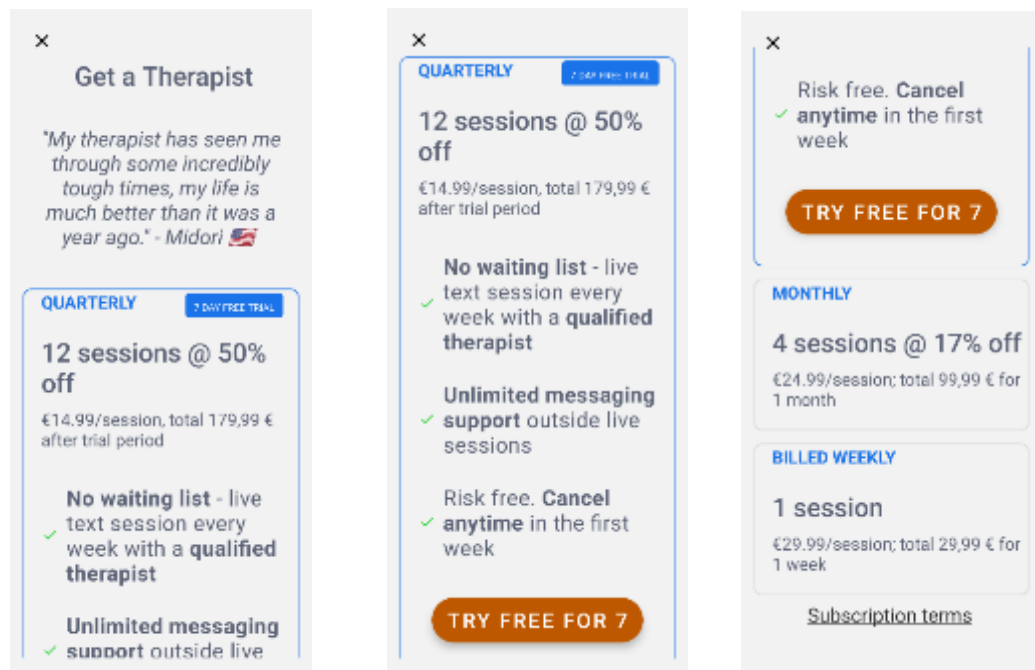
- The detailed plan is personal, depends on the information you have given to the app
- Select one by one each option and work on it, the time noted is approximated. Next screenshots are example of CBT cycle and Mindfulness





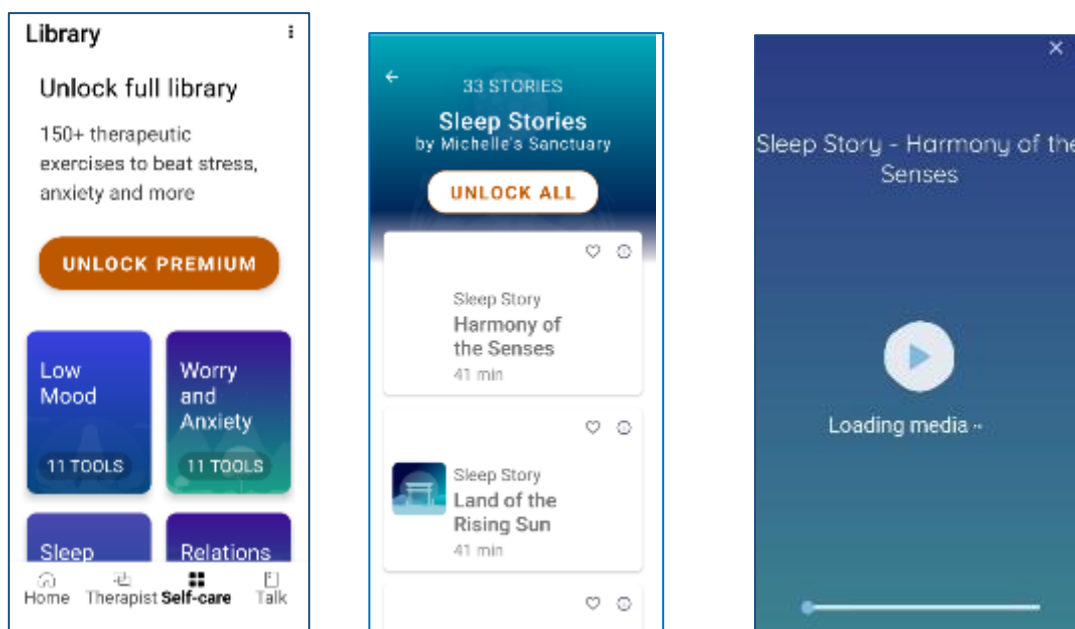
To use THERAPIST

- Click on crisis therapist button (bottom)
- Next screen will be this. This is a paid service
- If you consider, select the most accurate option for you and your situation



To use SELF-CARE (personal planning):

- Click on crisis self-care button (bottom)
- Next screen present organized tool by thematic, in order you select the most appropriate one for you.
- Next screenshots are example of Sleep stories



2.4. Self-assessment questions for the Module 4 Topic 2

1. Which feature of Wysa is likely to be especially beneficial for autistic university students who prefer reduced social pressure during communication?

- The availability of video-based human coaching
- The anonymous, text-based chatbot interaction
- The requirement to schedule live sessions
- The focus on spontaneous conversational flow

Correct answer: B

2. When considering Wysa as a support tool for ASD students, which pedagogical reflection is most appropriate for a university teacher?

- Wysa can fully replace campus disability services if used consistently
- Wysa's CBT and mindfulness tools may complement—but not substitute—specialized ASD interventions
- Wysa guarantees accurate interpretation of all user emotions and contexts
- Wysa is designed specifically to teach academic strategies and study skills

Correct answer: B

3. What is a realistic limitation teachers should anticipate when recommending Wysa to autistic students who rely on precise and literal language?

- a) Wysa provides overly complex, highly technical therapeutic explanations
- b) Wysa's AI may give generic or repetitive answers that do not always interpret context accurately
- c) Human coaching sessions are mandatory and may overwhelm literal communicators
- d) Wysa's structured style changes unpredictably depending on the user

Correct answer: B

4. From an accessibility perspective, why might Wysa be more immediately adoptable for university students compared to clinical platforms like Forta Health?

- a) Because Wysa requires a formal ASD diagnosis before use
- b) Because Wysa offers open public access with both free and paid options
- c) Because Wysa is only provided through institutional licensing
- d) Because Wysa restricts its use to healthcare professionals

Correct answer: B

5. Which scenario best demonstrates an **appropriate** educational use of Wysa within higher education?

- a) A teacher requiring all students with emotional difficulties to use Wysa instead of mental-health services
- b) A teacher using Wysa data to make academic decisions without student consent
- c) A teacher recommending Wysa as a voluntary, supplemental tool for emotional self-regulation during stressful academic periods
- d) A teacher replacing counseling referrals with Wysa's AI chatbot to save time

Correct answer: C

Topic 3. Real-time transcription apps

Authors: Cristina Duart Carrión, Sonia Renovell-Rico & M. Pilar Ortega-Leal

Duration 2 hours

3.1. Introduction of the scenario

Sustained attention in students with autism spectrum disorder (ASD) tends to be uneven. They may hyperfocus on topics that interest them but struggle with un motivating tasks or distracting environments (Barrios et al., 2019; Demetriou et al., 2019). Difficulties with inhibition, flexibility, and planning, especially when comorbid with ADHD, affect learning, participation, and autonomy (Demetriou et al., 2018; Muñoz and Rosero, 2023). Stress and sensory overload can further reduce attention (Demetriou et al., 2019). Structured activities, visual supports, breaks, adapted schedules, and organized environments are recommended to promote concentration and self-regulation (Barrios et al., 2019; Muñoz & Rosero, 2023).

AI-based real-time transcription tools use ASR and NLP to convert speech into written text during classes or meetings. By providing live transcripts, captions, and multilingual support, these tools reduce cognitive load and promote sustained attention in higher education settings.

3.2. Guiding to use the tool Otter.AI



<https://otter.ai/>

Otter is defined as an AI-powered meeting assistant designed to create a knowledge base through audio transcription, automated summary generation, and intelligent chat. It functions similarly to a personal executive assistant, capturing entire conversations, tracking key points, and managing follow-up tasks without interruption.

To use **Otter**, users should consider the following, which is available on different platforms:

- Desktop application,
- App for iOS and Android
- Chrome extensión

In terms of connectivity, it integrates with calendar tools such as Google Calendar and Microsoft Calendar to automatically join virtual meetings on Zoom, Microsoft Teams, and Google Meet.

In regard to account access, it is possible to start for free with a basic plan, although advanced features require paid subscriptions.

PROS - ADVANTAGES	CONS - DISADVANTAGES
Efficiency: Users report saving more than 4 hours per week by automating note-taking.	Limitations of the free plan: The basic plan offers limited transcriptions and AI features compared to the Business plan, which allows for a maximum number of minutes per month.
Accuracy: Reports up to 95% accuracy in its transcriptions.	Privacy: Use of the site and tool involves the handling of cookies and browsing data for personalisation and analysis.

AI features: Includes AI Chat that allows you to search for information in past meetings and generate content such as emails or reports.	
Automation: Automatically captures and assigns action items during conversations.	

Support for students with ASD that Otter offers:

- Live transcription: By allowing students to ‘see words as they are spoken,’ Otter provides real-time visual support that can make it easier to follow lessons if there are difficulties with auditory processing.
- Reduced cognitive load:
- By automating note-taking and generating structured summaries, students can focus on listening and participating without the pressure of writing by hand.
- Facilitates information structuring and self-regulated learning.
- Allows to review, edit, and share transcripts.
- Reduces anxiety associated with taking notes during live conversations.
- Organisation: The ability to extract key ideas and important information from recordings helps to organise study in a clearer and more accessible way. Allows keyword searches to quickly locate specific information.
- Provides multimodal input (audio and text), making it easier to understand complex information.
- Improves pragmatic comprehension by providing additional time to analyse the language used in conversations.

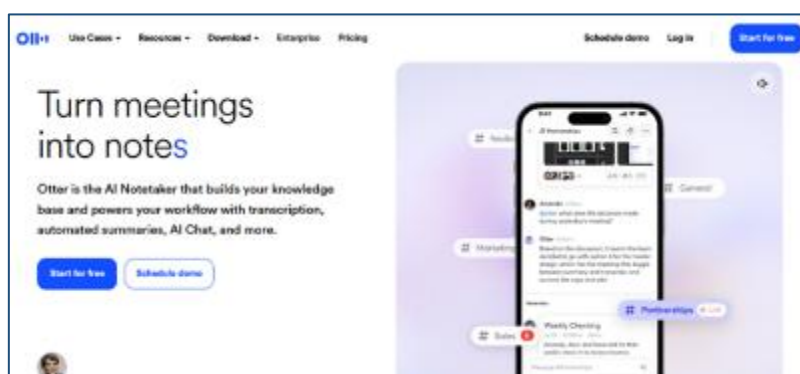
The following **challenges or limitations** can be identified for students with autism using Otter:

- Margin of error in transcription (95% accuracy). There is a 5% margin of error. For students who rely on literal interpretation or have difficulty managing ambiguity, errors in the transcription of keywords or technical names can lead to confusion or misunderstanding of academic content.
- Limitations of free and time-based plans. The free plan has restrictions. For a student who needs this tool as their primary support for accessing information, running out of monthly minutes or having the recording stop during a long class can cause anxiety or a significant disruption to their study routine.
- Lack of non-verbal context. Otter captures audio and converts it to text, identifying speakers. However, sources do not indicate that AI is capable of capturing tone of voice, sarcasm, body language, or social intentions. This represents a limitation for students with autism who often use support tools to understand the nuances of social interaction that are not purely verbal.
- Technical management and configuration burden. Although the tool seeks to simplify workflow, it requires integrations with calendars (Google or Microsoft), cookie permission management, and handling of multiple platforms such as Zoom, Teams, or Google Meet. For students with difficulties

- Technical management and configuration burden. Although the tool seeks to simplify workflow, it requires integrations with calendars (Google or Microsoft), cookie permission management, and handling multiple platforms such as Zoom, Teams, or Google Meet. For students with executive function difficulties, the initial setup and maintenance of these connections between applications can be overwhelming or stressful.
- Technological dependence and connection failures. The tool depends on connectivity and on the 'OtterPilot' joining the meeting correctly. If the bot does not join automatically due to a technical or network error, the student could miss class information, which negatively impacts their sense of predictability and order.

3.3. Practical component

Here you have a brief tutorial in order to explain you how to use Otter step by step.



Step 1: Create your free account

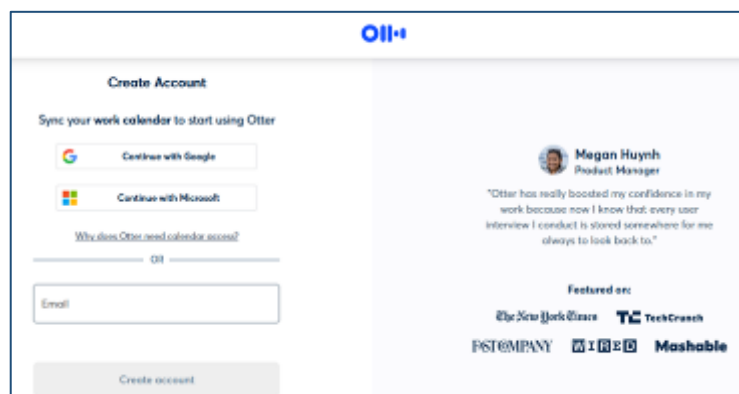
To get started, we need to register you on the platform.

Where to go: You can use the desktop version or download the iOS or Android app.

What to look for: Click on the button that says 'Start for free'. At the time of writing, there was a free version and a paid version available.

Pro tips: As you mentioned, you can use your Google account for instant access.

Students can use their school Google account to make it faster.



Step 2: Prepare your computer or mobile phone to integrate Otter

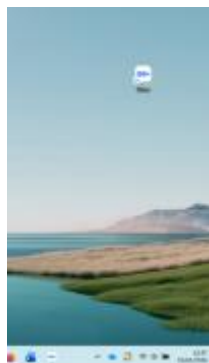
You need to take a few initial steps in order to use the tool and its features.

How to do it: Download the app to work on Windows desktop, the iOS or Android app, or the Chrome extension.

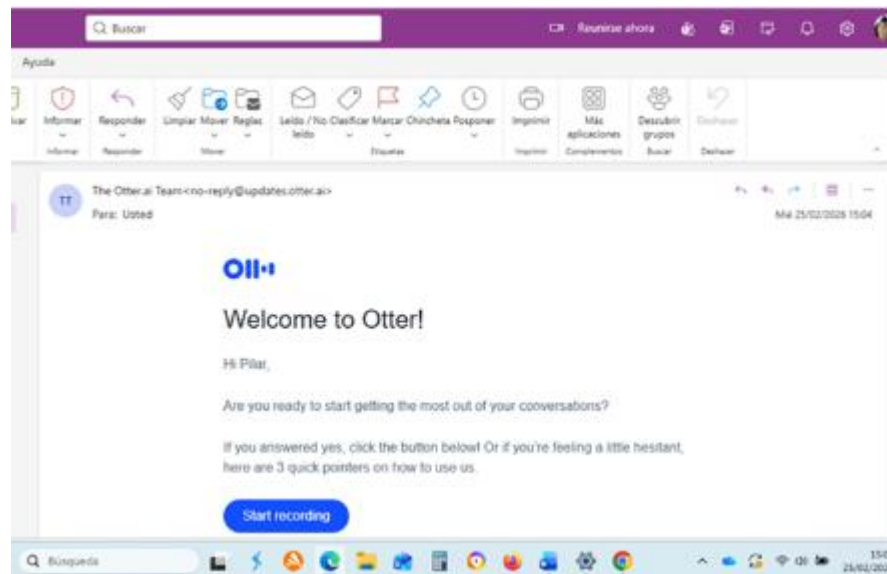
What will happen: The application will be downloaded to your desktop or mobile device.



What will happen: The application will be downloaded to your desktop or mobile device.



You may need to receive an email confirmation before you can begin. Please be patient if this confirmation does not arrive automatically.

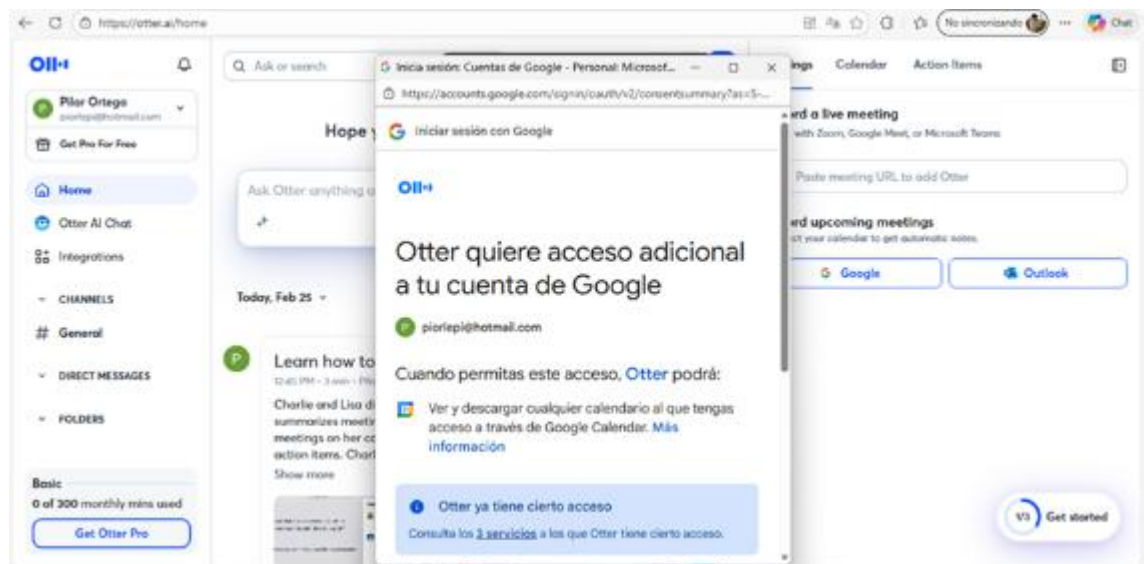


Step 2: Connect your calendar (Your assistant arrives on time)

You don't have to worry about inviting Otter to every class, we are going to automate it.

How to do it: Go to the Integrations section and connect your Google Calendar or Microsoft Calendar. You must confirm that you allow this access.

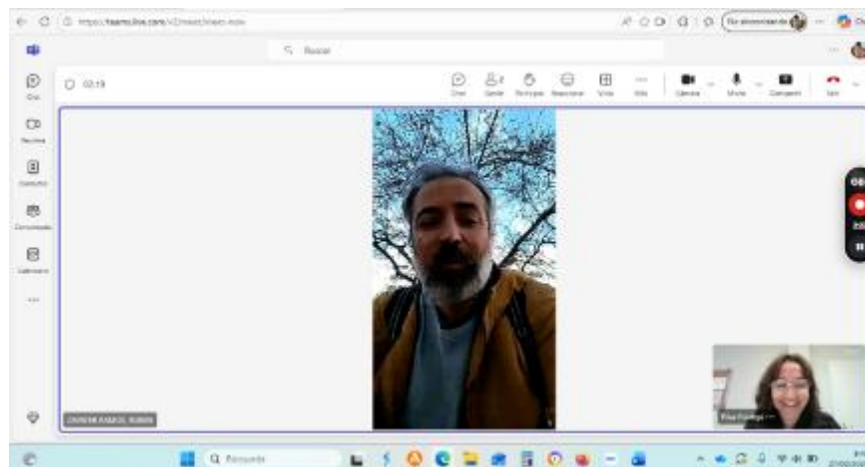
What will happen: Your assistant, called OtterPilot, will see your scheduled classes on Zoom, Microsoft Teams, or Google Meet and will join on its own to take notes for you.



Step 3: During class (Real-time visual support)

What you'll see: The live transcript will appear on your screen.

Why it helps: You will be able to 'see the words as they are spoken.' If you get distracted for a second, just read the text on the screen to get back on track with the explanation. Otter is up to 95% accurate, so the details will be there.

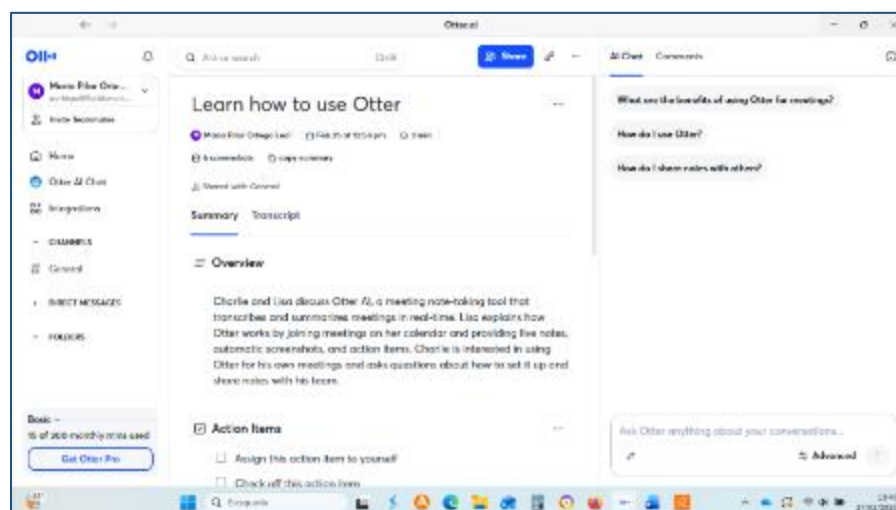


Step 4: After class (The smart summary)

When the session is over, Otter will process everything that was said.

Look for the 'Summary': Otter will condense it into a short, easy-to-read summary.

Key points: The system will automatically extract decisions and 'action items' (tasks or assignments I have assigned), so you know exactly what you need to do next.



Step 5: Ask Otter (Your digital memory)

If you can't remember a specific detail, you don't have to listen to the entire recording.

What to do: Use Otter's AI Chat. You can simply say 'Hey Otter' and ask a question.

Result: The chat will search the conversation and give you the exact answer to what I said in class, helping you quickly create reports or review content.

3.4. Self-assessment questions for the Module 4 Topic 3

1. What pedagogical rationale best justifies the use of Otter for students with ASD in higher education?

- a) It replaces the need for inclusive teaching strategies.
- b) It ensures completely accurate academic records.
- c) It reduces cognitive load, allowing students to distribute their attention more strategically.
- d) It eliminates the need for student participation.

Correct answer: C.

2. When considering executive function difficulties in ASD, which potential limitation of Otter requires the most pedagogical attention?

- a) Its integration with Zoom and Teams.
- b) The need to manage settings, calendars, and technical adjustments.
- c) Its ability to generate summaries.
- d) Its availability on mobile devices.

Correct answer: B

3. A student with ASD relies heavily on literal interpretation. Which feature of Otter could unintentionally create learning barriers?

- a) Real-time transcript viewing.
- b) AI-generated summaries.
- c) The 5% transcription error margin.
- d) Keyword search function.

Correct answer: C

4. From an inclusive education perspective, how should Otter ideally be implemented?

- a) As a universal substitute for note-taking for all students.
- b) As an optional support integrated into a structured pedagogical design.
- c) As a mandatory tool for students with disabilities.
- d) As a substitute

Correct answer: B

5. Which limitation of Otter most directly affects the pragmatic and social comprehension of students with ASD?

- a) Monthly transcription limits.
- b) Lack of integration with calendars.
- c) Inability to capture non-verbal cues such as tone or body language.
- d) Requirement for a paid subscription to access advanced features.

Correct answer: C

Topic 4. Tools assisting in note-taking and organization

Authors: Cristina Duart Carrión, Sonia Renovell-Rico & M. Pilar Ortega-Leal

Duration 2 hours

4.1. Introduction of the scenario

Executive functions (EF) are self-directed cognitive skills that enable planning, organization, inhibition, and flexibility to achieve goals. In ASD, inflexibility and rigidity affect decision-making, time management, and problem-solving (Barrios et al., 2019). Executive dysfunctions impact concentration, filtering irrelevant information, memory, impulse control, and study management, limiting autonomy and task initiation (Cahuana et al., 2024; Boza, 2025). Therefore, explicit training of EF is needed in both face-to-face and virtual contexts.

Universal Design for Learning promotes inclusive practices through multiple means of representation, action and expression, and engagement (Alba, 2019). Guideline 6 emphasizes supports for EF, such as checklists, planning templates, rubrics, self-monitoring questions, and task breakdown strategies (DUALTIC Project, 2015).

This scenario presents AI-based tools that support note-taking, task planning, organization, reminders, and distraction management, fostering autonomy and consistent learning routines in higher education.

4.2. Guiding to use the tool Tiimoapp



<https://www.tiimoapp.com>

AI tool developed by Helene Lassen Nørlem and Melissa Würtz Azari

Tiimo is a visual planning app that has been specifically developed to help people who have difficulties with executive functions. It transforms abstract to-do lists into concrete, manageable schedules. Unlike traditional calendars, Tiimo uses visual timelines and AI-powered task breakdowns to structure every part of a student's day.

Tiimo is not free software, but it offers a tiered approach to accessibility:

- Free version: provides essential features such as basic planning tools, to-do lists, and the focus timer.
- Tiimo Pro (paid): unlocks advanced features such as AI task breakdown, custom widgets, and more complex scheduling options.

To use Tiimo, users should note that multi-device synchronization is possible. The tool is available for iOS, iPadOS, watchOS, and as a web planner for desktop computers, allowing students to access their schedule from all their devices.

PROS - ADVANTAGES	CONS - DISADVANTAGES
Science-Backed Design: The interface is rooted in executive functioning research, specifically aimed at reducing the "friction" often felt by neurodivergent brains when planning.	Subscription costs: The most powerful features, such as AI-based task breakdown, which is often very useful for students with autism, are only available with the "Pro" subscription.
Reduction of Cognitive Overload: By visualizing the day and breaking down tasks, it prevents students from feeling "frozen" by complex assignments.	Platform limitations: Although there is a web version, the app is highly optimized for the Apple ecosystem (iOS and Apple Watch), which may exclude students using other types of hardware.
High Customization: Students can use colors and icons to personalize their planner, which has been shown to build motivation and consistency.	Use of data for analytics: While they do not sell personal data, the website and app use various statistical and marketing cookies to track user behavior and optimize the site.
Immediate Visibility: Through widgets and "Live Activities," students can see what is next without even opening the app, reducing the chance of distraction.	

Support for students with ASD that Tiimo offers:

- Visual and temporal anchoring. For students who struggle with the abstract nature of time, Tiimo provides a visual timeline and concentration timers. These tools allow students to "see time passing" through a countdown, helping them stay "anchored" to their current task and manage transitions between different academic activities without losing momentum.
- Cognitive load reduction through AI. One of the most significant challenges for students with ASD is "task paralysis" or the feeling of "freezing up" when faced with complex tasks. Tiimo's AI task breakdown allows students to enter a broad goal, such as a "blank mind," and transforms it into a series of clear, step-by-step, actionable items with estimated durations. This turns overwhelming to-do lists into "actionable plans."
- Personalization and a sensory-friendly interface. The app avoids unnecessary "clutter" or "pressure," focusing on a clean design. Students can personalize their planners using specific colors and icons. This isn't just an aesthetic choice; sources indicate that personalization generates the motivation necessary for neurodivergent students to use the tool consistently. In addition, widgets and "live activities" allow students to see their next task at a glance without the potential distraction of fully opening the app.
- Holistic wellness tracking. The tool includes features for tracking mood and energy levels. This allows students to reflect on their daily concentration and adjust their academic routines to suit their energy levels, helping them identify patterns that promote success over time.

The following **challenges or limitations** can be identified for students with autism using Tiimo:

- Learning curve and configuration. Some students may find it difficult to configure or customise the diary at first, especially if they are not used to digital diaries. Visual and customisable tools require an initial investment of time and attention to set them up correctly.
- Financial barriers to accessing advanced features. Although a free version is available, it only offers “essential features.” The most important tools for academic success, such as AI-powered task breakdown, custom widgets, and advanced scheduling options, are only available with a “Tiimo Pro” subscription. This may be a financial barrier for some students.
- Platform dependency. The app is heavily integrated into the Apple ecosystem. Although a web-based planner is available for use on desktop computers, students who do not use Apple mobile devices may not have the same seamless experience or access to “live activities” and specific mobile widgets.
- Data tracking and privacy considerations. The website and app use services such as Google Analytics and Microsoft Clarity to track user behavior in order to “optimize and personalize the experience.” For students who are very sensitive about data privacy, the need to manually manage or “block” these cookies through browser settings can be an additional administrative burden.
- Maintaining commitment. This requires students to “take ownership of the tool” in order to generate motivation. For students with severe executive dysfunction, the initial effort required to set up the system and respond to mood checks may still pose a barrier to entry.

4.3. Practical component

Step 1: Selecting the platform and explore the interface

Students can begin by accessing the Web Planner from a computer (via tiimoapp.com) or by downloading the application on iOS, iPadOS, or watchOS devices.

What to do: Access the web version or download the app (iOS or Android) and explore the main dashboard.

What you will see: A visual timeline of the day, tasks represented with icons and colors, and a structured but flexible layout.

- Consent: When logging in for the first time, users will be asked to manage their cookie settings (statistics and marketing). They can “Accept All” or “Save Settings” according to their privacy preferences.
- The account level must be selected, which can start with a free version.



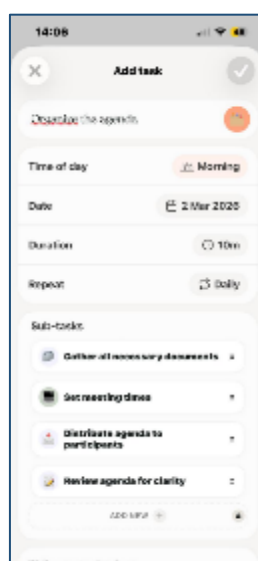
Step 2: Create a Visual Schedule

Tiimo organizes tasks into a timeline format, not just a traditional list. Use the to-do list feature to “empty your head” of all pending tasks and assignments.

How to create a task:

1. Click “Add task.”
2. Name the activity (e.g., “Read article,” “Prepare seminar,” “Attend lecture”).
3. Assign a time and duration.
4. Choose an icon and color.
5. Save.

Pedagogical application: Encourage students to break large assignments into smaller scheduled blocks, assign realistic time durations, and visually see workload distribution across the day or week. This reduces cognitive load and increases predictability. For complex tasks (e.g., ‘Write thesis chapter’), use the ‘Plan with AI’ feature. The student can type or dictate the task, and the AI will automatically break it down into a step-by-step plan with the estimated duration of each step.



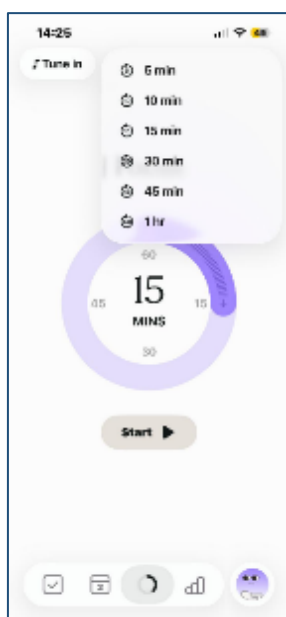
Step 3: Use concentration timers.

Tiimo includes concentration timers. This helps students start tasks, maintain focus, and switch between tasks.

How to use it:

1. Select a scheduled task.
2. Start the concentration timer.
3. Work until the timer ends.

As a teacher, you can recommend it for: essay writing blocks, study sessions before exams, or research reading periods.

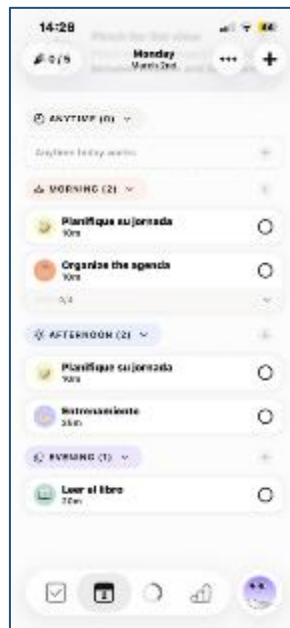


Step 4: Encourage the creation of routines

Routines reduce anxiety and decision fatigue. Tiimo allows for recurring activities.

How to set up routines:

1. Create a task.
2. Set it as recurring (daily or weekly).
3. Assign consistent time slots.



Step 5: Use mood tracking for reflection.

Tiimo includes a mood tracking feature. This promotes metacognition and emotional awareness. By spotting patterns over time, students can adjust their routines to suit their energy and concentration levels, ensuring they schedule the most demanding academic work during their peak performance hours.

How to use it:

1. At the end of the day, record your mood.
2. Reflect on patterns over time.

Educational application: You can encourage students to observe their emotional responses to workload, identify peaks of stress (e.g., before deadlines), or adjust their planning strategies accordingly.

4.4. Self-assessment questions for the Module 4 Topic 4

1. A lecturer wants students to better understand how long tasks actually take and improve transitions between study blocks. Which Tiimo function best supports this pedagogical goal?

- a) Live Activities and widgets
- b) Visual timeline with focus timers
- c) Use of marketing cookies for optimization
- d) Apple Watch integration

Correct answer: B

2. From an inclusive education perspective, which limitation of Tiimo could generate inequity among students?

- a) The need for personalization
- b) The existence of mood tracking features
- c) The subscription cost of advanced features
- d) The use of icons and color coding

Correct answer: C

3. A professor is concerned about students becoming dependent on digital tools rather than developing internal self-regulation strategies. Which identified limitation is most relevant to this concern?

- a) Financial barriers to access advanced features
- b) Platform dependency on Apple devices
- c) Learning curve and initial configuration effort
- d) Maintaining commitment and ownership of the tool

Correct answer: D

4. Which scenario best illustrates Tiimo's role in reducing cognitive overload for a student with ASD?

- a) The student uses mood tracking to reflect on weekly stress patterns.
- b) The student receives notifications through widgets.
- c) The student transforms a broad goal into step-by-step tasks with estimated durations.
- d) The student blocks cookies in their browser settings.

Correct answer: C

5. A university teacher is designing a workshop on executive functioning. Which explanation best justifies recommending Tiimo as a support tool?

- a) It replaces the need for academic accommodations.
- b) It visually structures time and tasks, reducing the friction associated with planning.
- c) It guarantees increased academic performance.
- d) It eliminates the need for student autonomy.

Correct answer: B

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