



The use of Assistive Technology in Education: A Guide for Teachers and Schools

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Contents

Acknowledgments	2
List of Abbreviations	5
Introduction	7
Teachers and School Teams Competences for using Assistive Technology in Learning	10
Set of Competences for teachers	13
Sections	15
Section 1: Inclusive Education	17
Overview	17
Can do: Competences relevant to this section	17
Know – Understand – Analyse	18
Key points to remember	18
1.1. Definitions, constructions and main models of disability	18
1.2. What is and What is Not Inclusive Education	19
1.3. Pedagogy of Inclusive Education: Main approaches	22
1.4. How is AT constructed around disability conceptualisations?	26
1.5. Inclusive Digital Education	28
Section 2: Assistive Technology	32
Overview	32
Can do: Competences relevant to this section	32
Know – Understand – Analyse	33
Key points to remember	33
2.1. Definitions, terminology and global situation in relation to AT	33
2.2. Frameworks and Tools for AT Assessment in Education	39
2.3. AT for access, communication and learning in education	45
Section 3: Learning Design, Differentiation and UDL	62
Overview	62
Can do: Competences relevant to this section	62
Know – Understand – Analyse	63
Key points to remember	63

3.1. Learning for all in the digital era with the integration of technology: Bringing together models from digital enhanced learning and AT	63
3.2. Inclusive lesson planning with AT and accessibility	66
3.3. Developing learning activities and material that integrate AT and include all learners	74
Section 4: Whole school approach and system level implementation	86
Overview	86
Can do: Competences relevant to this section	86
Know – Understand – Analyse	87
Key points to remember	87
4.1. Working together for planning effective implementation	87
4.2. Training and competence development for effective implementation	89
4.3. Monitoring, reflective practice and self-evaluation for effective implementation	92
ANNEXES	100
ANNEX 1: AT Assessment for Beginners: Three Steps and Five Tips to Assistive Technology Assessment (Katerina Mavrou)	100
ANNEX 2: Template for assessing lesson plans in terms of barriers and opportunities for the use of assistive technology for inclusive education (SKATE project training materials)	102
ANNEX 3: Lesson plan template to facilitate the use of assistive technology for inclusive education	103
ANNEX 4: Activity Analysis and Mapping for the use of assistive technology towards Universal Design for learning	104
ANNEX 5: Example of an assistive technology implementation plan template	106
List of References and Resources	108
Articles and Readings	108
Frameworks, Guidelines and Projects Reports	110

List of Abbreviations

AAATE: Association for the Advancement of Assistive Technology in Europe

AAC: Augmentative and Alternative Communication

ASL: American Sign Language

AT: Assistive Technology

ATLEC: Assistive Technology Learning Through a Unified Curriculum (project)

CAST: Center for Applied Special Technology (now used only as acronym)

CCTV: Closed-circuit television

CRC: Convention on the Rights of the Child

DAISY: Digital Accessible Information System

DigComp: Digital Competence Framework for Citizens

DigCompEdu: Digital Competence Framework for Educators

DIPAS: Disability Inclusion Policy and Strategy

EASTIN: European (now Global) Assistive Technology Information Network

ENTELIS: European Network for Technology Enhanced Learning in an Inclusive Society

EQF: European Qualifications Framework

f2f: Face to face

GAATO: Global Alliance of Assistive Technology Organizations

GEM: Global Monitoring Report

HAAT: Human Activity Assistive Technology (framework)

ICT: Information and Communication Technology

IEP: Individualized Educational Programme

IM: Instant messaging

IMPT: Institute for Matching Person & Technology

ISO: International Standards Organization

KPT: Keeping Pace with Assistive Technology (project)

LMS: Learning Management System

MPT: Matching Person & Technology (framework)

PECS: Picture Exchange Communication System

PPT: PowerPoint

rATA: rapid Assistive Technology Assessment

SAMR: Substitution, Augmentation, Modification, Redefinition (model)

SELFIE: Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies

SETT: Student, Environment, Tasks, Tools (framework)

SKATE: Skills & Knowledge on Assistive Technology in Early childhood inclusive education (project)

STEM: Science, Technology, Engineering, Mathematics

UDL: Universal Design for Learning

UN CRPD: United Nations Convention on the Rights of Persons with Disabilities

UNICEF: United Nations International Children's Emergency Fund

WATI: Wisconsin Assistive Technology Initiative

WHO: World Health Organization

Introduction

This Guide is for teachers and school teams and aims to provide an overview of the basic principles and steps that educators can follow to promote the use of Assistive Technology (AT) for multiple learning delivery modes, including in-person, distance, blended learning and hybrid.

The Guide builds on the understanding that the distinction between Information Communication Technology (ICT) and AT is rather blurred. Although there are technologies that are being developed specifically for children with disabilities (e.g., alternative input devices, rehabilitation software/apps etc), they are nevertheless increasingly being used in combination with or substituted by mainstream digital technologies. Because of the convergence between mainstream and assistive technologies, educators are now required to be aware of the potential and usefulness of both ICT and AT to ensure inclusion of their students. Hence, the guide refers to assistive and digital mainstream technologies that are useful for inclusive education.

Furthermore, the Guide promotes an approach to implementation of AT for inclusive education as part of the whole school approach and in collaboration with others. Thus, it is assumed that the professionals in the field of education (e.g., classroom teachers, special educators, teacher assistants, occupational therapists and speech and language therapists) are involved and collaborating for supporting all learners both in the school and the community.

The Guide provides the key principles to consider when adopting an inclusive approach to designing and implementing learning and ensuring that teaching materials and methodologies are accessible and effective for all children, while maximizing participation opportunities for children using individual assistive technologies. To do so, teachers need to be aware of the wider inclusive education ecosystem and the collaborations they can have in identifying needs, selecting and/or creating resources and co-designing approaches in order to successfully implement inclusive learning.

The realization of inclusive education, with the support of AT is a complex process that involves multiple stakeholders in an interplay of processes and activities, where strong communication and a vision of the broader ecosystem is key. Each stakeholder regardless of the service and setting in which AT is provided holds a unique but interconnected role. Thus, this Guide aims to demonstrate that the teacher, the classroom and the school are not separated from the broader ecosystem. Teachers need to have a broader understanding of the ecosystem of AT and inclusive education. This broader understanding is the ground on which specific competences can be developed to enable teachers' instructional and learning facilitator role for developing and implementing inclusive and AT supported learning experiences for all.

Furthermore, AT has multiple roles in making inclusive education happen. Appropriate use of AT in education is linked to every aspect of the school physical, learning and social environment. Ensuring that school premises are physically accessible through AT and accessibility accommodations is the first step. AT has an essential role in rehabilitation and functional empowerment of children with disabilities. Supporting functionality through AT in both physical and digital activities is a next step for making participation in education possible. Lastly, AT provide a huge potential for transforming and redefining the learning process, in ways that enable not only functional participation in learning, but also enhancing motivation for fulfilling all children's expectations and potential. The teachers may have a role in all aspects of the use of AT for inclusive education, but their role is anticipated as paramount in the more instructional aspect, for employing AT in designing and implementing learning processes and experiences. Thus, the focus

of this Guide is mainly to walk teachers through steps of learning design with AT, but also make links to AT tools and broader inclusive pedagogical approaches.

One of the main barriers to support inclusive education for all learners and especially learners' with disabilities is the lack of awareness and relevant competences of various stakeholders in the educational sector (Hoogerwerf and Mavrou, 2021). Through the years, acknowledgement of such barriers led researchers and professionals in the fields of inclusive education and (assistive) technology to explore ways to empower educators and facilitate capacity building towards the use of assistive technology in educational settings for inclusive education. Thus, this Guide is building upon existing relevant work and integrates resources and materials available from the following key projects and initiatives:

[The SKATE Project](#): The Skills & Knowledge on Assistive Technology in Early childhood inclusive education (SKATE) project is a three-years (2020-2023) EU co-funded project which aimed at fostering new skills and knowledge for teachers and educators for the appropriate use of assistive technology and digital technology for inclusive early childhood education. A relevant competence framework for teachers and a set of guidelines through a co-design and participatory approach with teachers and other stakeholders working with children with disabilities which facilitated the development of localised training modules for teachers, piloted and validated in the partner countries. These resources and the research work linked to teachers' experiences have been considered for building this Guide, particularly the [teachers' competences](#) section of these Guidelines adopted and adapted from the SKATE Competence Framework,, as well as and the theoretical parts (Know- Understand – Analyse) .

[UNICEF Resources](#): UNICEF has developed numerous materials and guidelines, either connected to the needs of specific regions or more generally relevant to all areas and sectors working with children and/or children with disabilities. In addition, using UNICEF resources keeps the focus on UNICEF's vision, mission and values.

The [ENTELIS network](#): which originates from an EU co-funded project (2014-2016) which grew into a network of partners. The vision and activities of ENTELIS focus on digital competences and the reduction of the digital divide of persons with disabilities of all ages. Building on this vision, core members of the ENTELIS network with additions of various other European partners developed a series of projects and tools aiming at the digital empowerment of persons with disabilities, particularly the ENTELIS self-assessment tool for schools that aims to help school teams to reflect on the inclusive culture, policy and practices in relation to the use of technology and digital inclusion of all children. The ENTELIS+ Glossary is also used here in the sections of definition and terminology, together with UNICEF's Glossaries.

[European Agency of Special and Inclusive Education¹: Inclusive Digital Education](#): In 2022 the Agency focused on Inclusive Digital Education and collected information and resources that identify the main pillars for addressing inclusion in digital education. The report provides a theoretical background for empowering teachers' practices.

¹ The European Agency of Special and Inclusive Education is an independent organisation that acts as a platform for collaboration for the ministries of education in European countries members of the Agency. The Agency's work is to support the development of inclusive education systems through various activities.

Therefore, drawing from previous work and experiences, the following key principles are considered in the development of the Guide:

- 1 Assess the needs and barriers to equal access and participation in the learning process for all learners.
- 2 Choose and integrate assistive technology in the design, development and implementation of learning activities based on inclusive pedagogies.
- 3 Identify the added value of assistive and accessible technology in removing barriers and increasing participation in education.
- 4 Work collaborative in a whole school approach.

The above principles are considered fundamental for capacity development of teachers in using assistive technology. Assistive technology (AT) is a multi-faced field and there are increasing advances of embedded accessibility in mainstream technology that aim to facilitate the use of technology by diverse groups of users. The interaction between assistive technology and mainstream accessible technology becomes an additional issue for consideration. Hence, the effective implementation of these technologies in education in a way that will create inclusive learning experiences, requires teachers to develop a range of competences. These are related to:

- awareness, understanding and implementation of the principles of inclusive pedagogies;
- awareness, knowledge and practical skills in selecting and using AT, as well as facilitating learners to use their on AT
- treating assistive technology as an integral part of the learning process during learning design and teaching practice, and
- addressing all issues in relation to AT through collective and more systemic (in the school micro-system) approach.

Following the above rationale and principles, this Guide is structured as follows:

- A set of competences is initially presented as a comprehensive overview of skills, knowledge and attitudes related to different areas of professional development for teachers. They refer to successful design, development, implementation and assessment of inclusive educational activities, with the use of assistive technology.
- Following the set of competences, the Guide is divided into four Sections: (a) Inclusive Education: Identifying challenges and responses to inclusive and digital inclusive education; (b) Assistive Technology: Identifying, selecting and using assistive technology; (c) Learning Design, Differentiation and Universal Design for Learning: Designing inclusive learning processes and activities with the use of technology; and (d) Whole school approach and system level implementation.
- Each section is introduced with a short summary of key points, linked to particular teacher competences, basic concepts and theoretical background. This is further enhanced with lists of additional resources. Moreover, in each section scenarios and examples of implementation are provided, followed by points of reflection and consideration.
- Case studies are used to facilitate an understanding of the main concepts and approaches elaborated. They reflect real school life situations which may also include segregation practices. The intention is to realistically frame this Guide with existing educational practices and show that inclusive education practices can be continuously advanced, including through use of AT.

Teachers and School Competences for using Assistive Technology in Learning

Competence development for the use of AT in inclusive education is a key factor for success, for both teachers and learners, as well as other involved stakeholders. Integrating AT in the learning process for successful inclusive education requires combined competences both in the broader area of digital/technological literacy, as well as across all areas of pedagogy and instruction. Such competences involve teachers' knowledge and skills for choosing and using AT while being part of a school team, making AT part of the learning process, designing activities that take into consideration individual learners' assistive technology, but also supporting learners in developing their own AT and digital competences. In addition to these, it is also anticipated that teachers' capacity is developed upon the foundations of inclusive pedagogies, which entail identifying barriers in learning for all learners and acknowledging the imperative of providing equal opportunities for participation in all aspects of learning.

In the following, a set of competences for teachers' and school teams' capacity development is recommended. Competences included here are adopted and adapted from [the SKATE Competence Framework](#), which focuses on capacity development of educators in the broader sense, including other professionals working with learners, to choose, use and integrate AT in learning activities for all learners which acknowledges other similar frameworks, and builds on them,² in order to make competences more specific to AT, inclusive education pedagogy and children's education. In addition, the framework is short and specific for developing targeted teachers' and school teams' professional development and training programmes. The first two elements are particularly relevant to this Guide, Design of Curriculum and Learning Process and Implementation of Teaching and Learning Strategies.

Moreover, it is considered that the effective use of AT and the promotion inclusive education constitute a matter of digital literacy for both users/learners and educators. Acknowledgement of the barriers in relation to digital literacy and digital competence development has led to the design of several competence frameworks specific to particular groups of users, groups of professionals or other target populations, or even to particular context of implementation, types of technology or set of competences (Mavrou et al, 2022). In this context, other frameworks were also considered³ an r.

In conclusion, the set of competences recommended in this Guide have been reframed and formulated to consider:

- 1 Level of Education:** The SKATE project focuses more on Early Childhood Education, and thus for the purposes of this Guide, competences and indicators have been adjusted to a broader perspective of education. In addition, following the example of the EDC that captures teachers' specific digital competences across primary and secondary education, competences are articulated using the broader pedagogical discourse and terminology and not focusing on particular educational level.

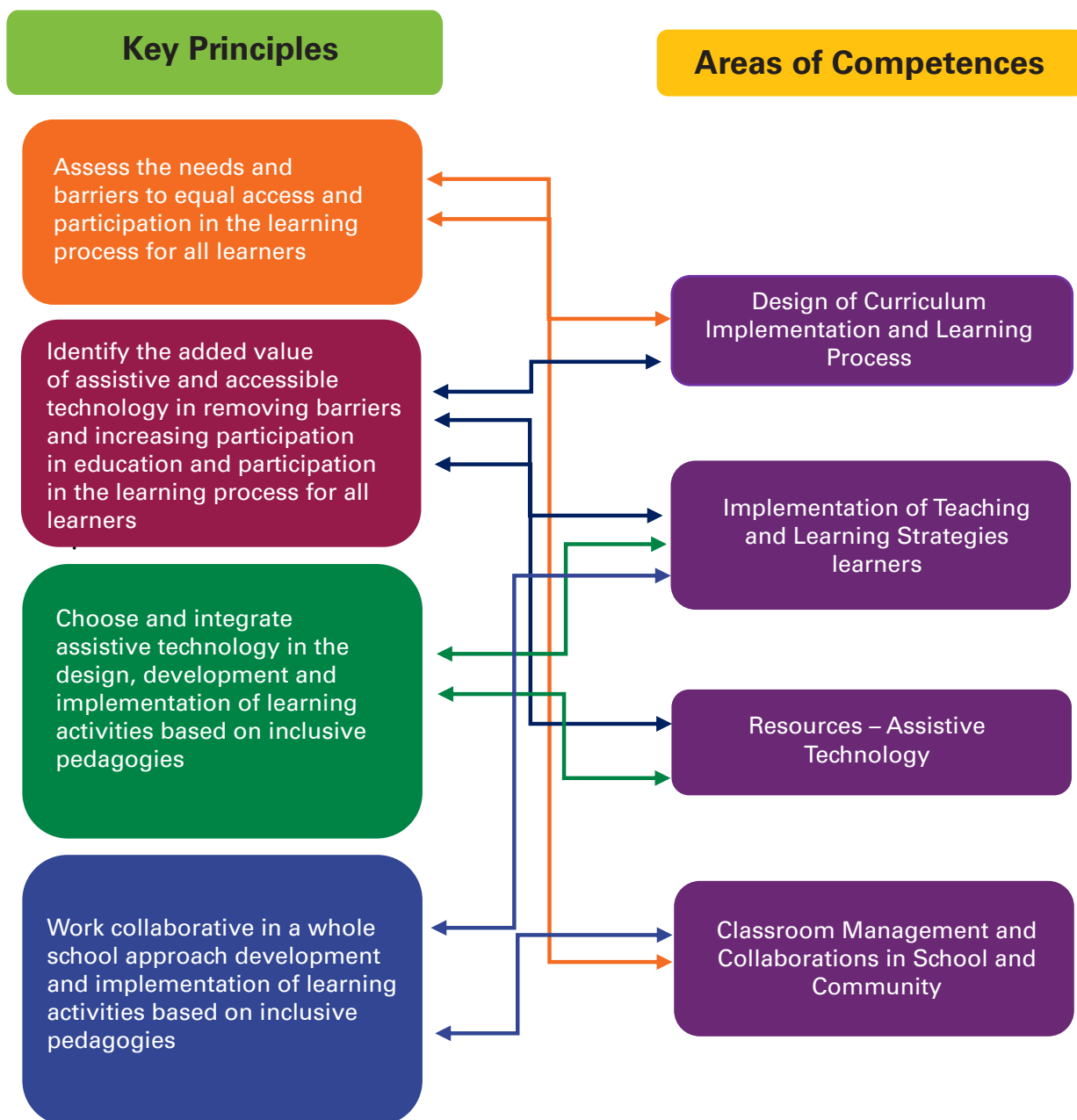
²The Index for Inclusion, the Universal Design for Learning, the Entelis+ Competences Framework, the KPT Guidelines for Lifelong Learning in Assistive technology, DigCompEdu

³ [Educator's Digital Competence Framework \(UNICEF, 2022\)](#), European Digital Competence Frameworks (e.g. DigCompEdu, UNESCO's ICT Competence Framework for Teachers

- 2 Levels of competences and progression:** The SKATE Competence Framework distinguishes between levels for which different steps of progression, proficiency and expertise is defined, which is common for competence frameworks. In general, some frameworks use a three-level approach e.g., Basic, Average, Advanced or Core, Intermediate, Advanced, etc. Others use a six or eight level approach (e.g., see DigComp 2.1. for Citizens), which further split the three common levels to more specific and detailed progression of competence. In addition, some frameworks define their levels according to standard education levels such as the EQF levels, while others choose to either define their levels in the more specific context of the particular framework, or follow a holistic approach, without distinguishing levels. The last approach is applied in this Guide. The proposed set of competences is considered essential for all teachers in terms of having basic knowledge, skills and attitudes beyond the level of awareness, being able to implement these in the learning and instruction, as well as being sharing and supporting peers.
- 3 Areas of competences:** The SKATE Framework identifies four areas of competences which are more specific to the methodological and instructional aspect of learning design and same areas have been employed here.
- **Design of Curriculum and Learning Process:** This area includes competences for learning design in the framework of inclusive education: i.e., assessment of needs and barriers (identification of children needs and prior experiences), setting inclusive objectives and learning outcomes, plan/design inclusive learning and assessment activities, developing and integrating Individualized Educational Programmes (IEPs) in the inclusive classroom curriculum, and consider UDL guidelines as indicators.
 - **Implementation of Teaching and Learning Strategies:** This area includes competences for implementing inclusive pedagogies, integrating AT in the learning process and implementing UDL guidelines and differentiation with the use of AT.
 - **Resources – Assistive Technology:** This area includes knowledge of AT that can be used in education, selection, modification, development/creation, and use of basic resources and educators’ own digital competences.
 - **Classroom Management and Collaborations:** This area includes definition of roles including parents’ and learners’ involvement, collaborative teaching, AT experts and other professionals, more practical management issues such as setting up the equipment, safety, maintenance and technical support, and classroom set up.

The above areas are framed in the broader educational spectrum of teachers’ competences in terms of pedagogy, learner support, learning and classroom management, collaboration, professional development and communication. Therefore, they are aligned to the four areas of the EDC: Knowledge Development, Knowledge Application, Knowledge Sharing and Knowledge Communication. Furthermore, competences have been developed in line to the key principles on which this Guide is founded and have been outlined in the Introduction. Mapping of the key principles and the Areas of Competences is presented in Figure 1.

Figure 1: Mapping key principles and areas of competences



In the following Sections, individual competences are connected accordingly to each section. The aim is to use associated competences as indicators and core elements of teachers’ capacity in each section. They can therefore serve as guidance for teachers and school teams to reflect on their own perspective, practices and needs for using AT for inclusive education. Mapping own practices across competences and development of teaching and learning scenarios, can be a useful tool for evaluating capacity and identifying gaps and opportunities.

How can this set of competences be used?

Beyond serving as guidance for teachers reflecting on own capacity and needs, competences listed here can be used to assist training teams and involved stakeholders to design and develop learning programmes for educators’ training. Competences in each area can be used as learning objectives or be elaborated into more specific learning outcomes customized to particular educational settings, countries, groups of teachers and school teams, learning environments and

modalities, or different educational levels. Further, professional development and teachers' and other school professionals' training modules can be designed, where content and materials will be aligned to learning objectives and evaluated across the identified targeted competences.

Set of Competences for teachers

The competencies are listed here as whole set, but also mentioned under each section which focuses on specific competency.

Area 1: Design of Curriculum Implementation and Learning Process

- 1.1. To identify the importance of participation for all.
- 1.2. To seek and remove physical, digital, societal and other barriers to participation for all learners, including inaccessible environments.
- 1.3. To plan lesson and learning activities while having all learners in mind.
- 1.4. To design evaluation activities contributing to the achievements of all learners.
- 1.5. To design learning activities that promote learners' education, collaboration and participation.
- 1.6. To be aware of the importance and the benefits of Information Communication Technology (ICT) and Assistive Technology (AT) for all learners and especially learners with disabilities.
- 1.7. To consider principles of Universal design for Learning (UDL) in terms of engagement, representation and action & expression in all aspects of the learning process.
- 1.8. To consider the use of AT as a tool for removing barriers in the various aspects of the learning process design.
- 1.9. To transfer the AT relevant objectives of the learners' individualized educational programs into inclusive lesson planning.
- 1.10. To design curriculum and lessons that promote awareness and acceptance of AT and diversity to all learners.

Area 2: Implementation of Teaching and Learning Strategies

- 2.1. To encourage participation, support and provide possibilities for learners to use AT in activities in and out of the classroom.
- 2.2. To apply basic accessibility solutions and AT in learning activities for learners with disabilities.
- 2.3. To integrate ICT and AT, including personal AT of learners, as an integral and embedded part of learning activities.
- 2.4. To differentiate materials, learning objectives, teaching methodologies and assessment approaches with the use of AT and accessibility requirement for each learner.
- 2.5. To provide positive role models of using technology solutions by teachers.
- 2.6. To integrate alternative options for learning, language and communication, and physical access and motor needs of all learners through AT.
- 2.7. To provide alternative methods of assessment of cognitive learning, language and communication, motor and sensory learning, development and performance of all learners with the use of AT.
- 2.8. To encourage communication with various and alternative means amongst all learners
- 2.9. To provide opportunities of familiarizing with ICT and AT for all learners.
- 2.10. To promote all learners' interaction and collaboration through the use of AT.

Area 3: Resources – Assistive Technology

- 3.1. To distribute school resources fairly in classroom supporting inclusion.
- 3.2. To have knowledge of basic AT that can be used in the classroom.
- 3.3. To recognize basic common AT solutions for particular children's needs.
- 3.4. To set up, configure and implement common/basic assistive technologies and specific equipment used by specific learners.
- 3.5. To search and identify/select AT and accessibility resources for the particular needs of individual learners.
- 3.6. To be aware and use the referral routes including access to funding, professional advice on the use of AT and support as required to address learners' needs.
- 3.7. To create accessible materials to support children participation in learning.
- 3.8. To recognize the limitations of AT resources and seek continuous improvement.
- 3.9. To know and use reliable sources of information and resources about AT solutions at local/national level and international level.
- 3.10. To validate the appropriateness of the AT used by the learners.

Area 4: Classroom Management and Collaborations in School and Community

- 4.1. To communicate and collaborate with school assistants and other stakeholders (e.g., parents, other teachers) for the implementation of the AT within the school setting.
- 4.2. To plan, teach, review and solve problems on the use of AT following a team. approach in inclusive education by getting involved in multi-disciplinary teams.
- 4.3. To be aware of the need to stay up-to date with innovative practices in the use of AT in inclusive education.
- 4.4. To implement and share with colleagues, self-reflective practices for the use of AT for inclusive education.
- 4.5. To support children's parents and colleagues through the AT selection and funding processes/mechanisms.
- 4.6. To organise the learning environment (activities, resources, opportunities for participation, collaboration, etc.) to promote interaction and respect learners' individual needs and characteristics.
- 4.7. To manage, set up, maintain, upgrade and ensure safety of AT.
- 4.8. To recognize possible safety issues related to ICT/AT use in order to plan mitigation/reduction strategies.
- 4.9. To manage communication with national or local authorities for issues of AT.
- 4.10. To encourage participation in projects and innovations using AT in inclusive education.

Sections

In the following, the four sections of the Guide: “The use of AT in Education: A guide for teachers and school teams”, are elaborated.

The Four Sections are:

Section 1:

Inclusive Education: Identifying challenges and responses to inclusive and digital inclusive education.

Section 2:

Assistive Technology: Identifying, selecting and using assistive technology.

Section 3:

Learning Design, Differentiation and UDL: Designing inclusive learning processes and activities with the use of technology.

Section 4:

Whole school approach and system level implementation.

What to expect in each section

Each section is structured in the following way to enable users of the Guide to navigate through the various parts:



Overview

Introduction: a short summary of the key points



Can do

Competences: Corresponding competences for capacity development in the relevant area(s).



Know – Understand – Analyse

Content/concepts/theory: Basic concepts and theoretical background and summarizes main points with reference and links to original sources, summarized in *keypoints to remember*.



Read – Search – Consult

Resources: List of resources, readings and sources of material and ideas to read, search and consult



Develop ideas

Scenarios – Examples: Case studies, scenarios and examples of implementation.



Additional Resources and Tips

Tips and some extra information: Highlights in given resources, extra material and cues for further consideration.



Think – Reflect – Act

Activities: Points for reflection and action.



Section 1: Inclusive Education

Identifying challenges and responses to inclusive and digital inclusive education



Overview

This Section focuses on basics of inclusive education and the principles for designing learning processes which promote learning and participation for all learners. The belief that every child has a right to a quality education that respects and promotes dignity and optimum development, are at the core of [The Convention on the Rights of the Child \(CRC\)](#) and the [Convention on the Rights of Persons with Disabilities \(CRPD\)](#). Albeit the fact that these values are adopted and promoted by Global, Regional and National bodies and policies, there are still numerous challenges and barriers that prevent equal access to education for all children. UNICEF has developed several resources and material for supporting teachers in promoting inclusive education (i.e., UNICEF’s Teacher Training Modules for Inclusive Education, 2015) linked to this section. Therefore, in this section on Inclusive Education, guidelines are developed as reminder of the core concepts and principles of inclusive education, looking a bit back on how this is related to constructions of disability and diversity, and what is the impact of the emergence of assistive and digital technologies and vice versa.



Can do: Competences relevant to this section

Main assumption: Teachers and school teams need to be able to assess the needs and barriers to equal access and participation in the learning process for all learners.

- To identify the importance of participation for all.
- To seek and remove physical, digital, societal and other barriers to participation for all learners, including inaccessible environments.
- To be aware of the importance and the benefits of ICT and AT for all learners and especially learners with disabilities
- To encourage participation, support and provide possibilities for learners to use AT in activities in and out of the classroom



Know – Understand – Analyse

Key points to remember

- The way disability is constructed over different ideologies, theories, philosophical and pedagogical paradigms, has an impact on the educational approaches for children with disabilities and other groups of children
- Inclusive education is not another form of special education and neither an improved version of integration
- Inclusive education includes all groups of children and embraces a whole school approach
- The way disability is constructed over different ideologies, theories, philosophical and pedagogical paradigms, has an impact on the way AT is used in education
- Inclusive Digital Education holds the same premises as inclusive education

1.1. Definitions, constructions and main models of disability



Key point: The way disability is constructed over different ideologies, theories, philosophical and pedagogical paradigms, has an impact on the educational approaches for children with disabilities and other groups of children.

Disability constructions and discourses are often related to the disability models which constitute different viewpoints regarding how disability is understood and conceptualised. The main models of disability (but not the only ones) identified are considered to play a catalytic role in the education of learners with disabilities and the struggles for equal opportunities. This Guide builds upon the **human rights approach** to disability, as this is endorsed by the UN Convention for the Rights of Persons with Disabilities (UNCRPD). It recognises that disability is a part of human diversity that must be respected and supported in all aspects. Emphasis is placed on the rights of people with disabilities to equal participation in all sectors of life. Adopting a human rights perspective teachers and school teams are prevented from viewing disability under theories of solely medical explanations and the need to 'restore... to normality', as constructed by the **medical model** of disability, as well as theories of victimization, incapability of learning and being autonomous, under the **charity model**. Also, the human rights perspective helps teachers to understand disability as a result of physical and social barriers, as defined by the **social model**, and the need is to acknowledge and remove barriers in order to empower learners with disabilities. In addition, the human rights model takes into consideration the criticism of the social model as inadequate to acknowledge the person's identity as a whole.

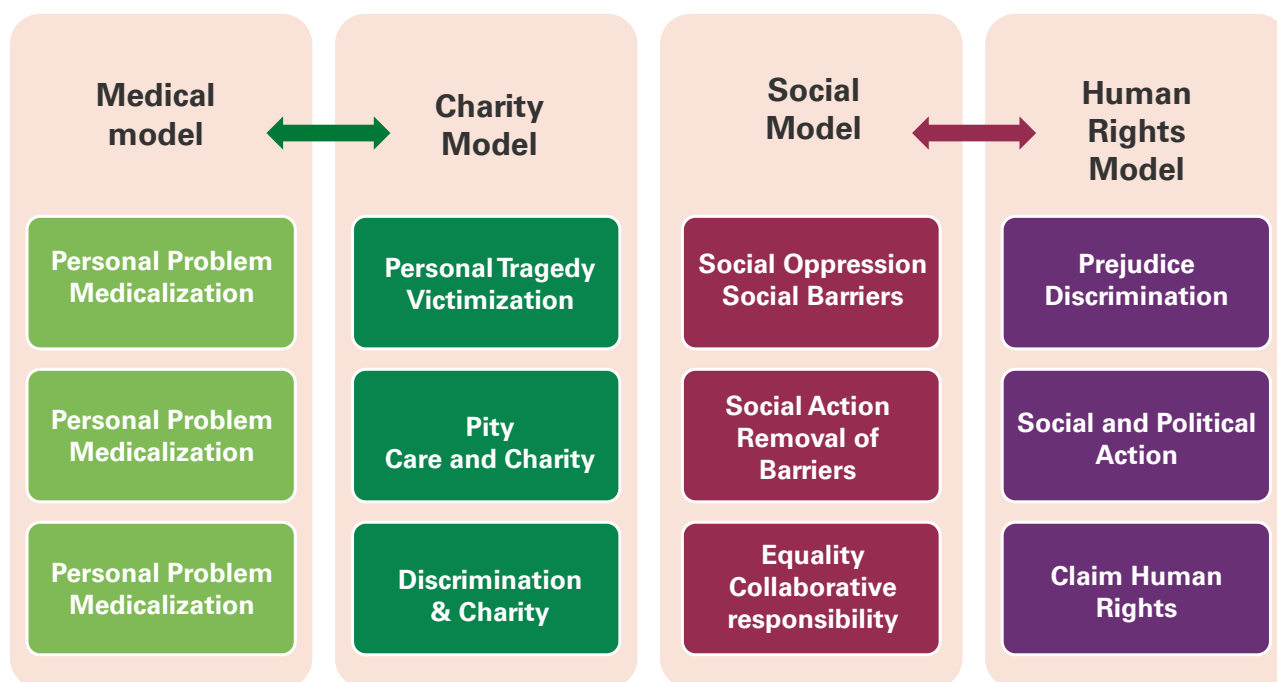


Figure 2: Overview and connections of Disability models: Disability perspective, response and outcomes (SKATE Guidelines, 2022)

Figure 2 illustrates how disability is conceptualized through each model, what is considered as appropriate approach and what is the result of this conceptualization and approaches. In addition, the figure illustrates the connections between the medical and the charity model, both resulting to prejudice and discrimination, as well as the connection between the social and the human rights model, both highlighting acknowledgment of barriers and the responsibility of society and political action as well as the need to build persons' agency and self-determination.

1.2. What is and What is Not Inclusive Education



Key point: Inclusive education is not another form of special education and neither an improved version of integration.

Understandings and constructions of disability through the various disability models have impacted the education policies and practices of children with disabilities. Often it is easier to understand inclusive education if it is examined against other forms and approaches to the education of diverse learners. In the following Table 1 the main approaches including special education, integration and inclusive education are presented in summary points (SKATE Guidelines, 2022).

Table 1: Summary of approaches to the education of diverse learners

Special Education	Integration	Inclusive education
<ul style="list-style-type: none"> • Where: Separate structures, curricula, material, activities • How: Special curriculum, with often 'less' content and 'fewer' expected outcomes (Lewis and Norwich 2005) • Emphasis: Medical model: 'Problems' within the child should be remedied • Result: No equal curriculum and opportunities to all learners. 	<ul style="list-style-type: none"> • Where: Children's placement in existing (inflexible) mainstream school • How: Modify schools and existing practices and infrastructures when there is a need (Sebba & Ainscow, 1996). • Emphasis: Attention is not the quality of students' experiences. • Result: Focus on socialization rather than equal opportunities in education. 	<ul style="list-style-type: none"> • Where: A movement against exclusionary practices in education • How: Restructure schools at all levels (curriculum, staff culture, school buildings, etc.) • Emphasis: Social model: Barrier free schools • Result: Human rights: Equal opportunities for all children to access, participate and learn while considering their interest, talents and abilities

It is noted that these approaches to the education of children with disabilities cannot be considered successive of one another over time, and emergence of one does not mean the elimination of the other. The majority of educational systems around the world are still struggling towards the establishment of inclusive education policies and practices, and both special education and integration approaches co-exist even within the same systems. In addition, by no means inclusive education can be considered as an extension of special or integrated education. Inclusive education is an entirely new educational venture, a totally different paradigm, calling for an educational transformation for social justice, which is also particularly addressed in Article 24 of the UNCRPD.

Box 1: UNICEF's Approach to Inclusive Education

Inclusive education is the approach UNICEF employs to ensure every child receives a quality education. Inclusive education as defined in the Salamanca Statement promotes the "recognition of the need to work towards 'schools for all' – institutions which celebrate differences, support learning and respond to individual needs" (pg.2). Inclusive education is a process that values the well-being of all pupils and is not an end in itself. (UNICEF, 2015a, p. 6

The article 24 on Education of the UN CRPD is expected to be articulated in policies and practices for inclusive education, as a shared vision for a 'school for all'. Comment 4 of the UN committee highlights that:

Box 2: Article 24 States must ensure for persons with disabilities:

- the right to education without discrimination and on the basis of equal opportunity;
- an inclusive education system at all levels;
- provision of reasonable accommodation, and individualised support measures;
- opportunities to acquire skills to ensure equal participation in education and community;
- access to teachers qualified with appropriate skills
- progressive realisation
- comment No 4 highlight action required for implementation
- Structures and systems
- Legislation and policy
- Planning and data collection
- Resourcing
- Teacher education and support
- Student assessment
- Accountability and monitoring



Read – Search – Consult

Need more information and training on the basics of inclusive education?

UNICEF’s Teacher Training Modules for Inclusive Education (2015). [Introductory booklet](#)

[Module 1: Vision, Theory and Concepts](#)

Activity 1.5.3, in [Module 1: Vision, Theory and Concepts](#) (UNICEF, 2015), guides you through an experience of creating a shared vision for inclusive education that can be used to develop such a vision in their own settings/school.



Additional Resources and Tips

[Index for Inclusion \(3rd Edition\)](#)

[UNICEF Disability Inclusion Policy and Strategy \(DIPAS\) 2022-2030](#)

[Global Monitoring Report \(GEM\) inclusive education](#)

1.3. Pedagogy of Inclusive Education: Main approaches



Key point: Inclusive education includes all groups of children and embraces a whole school approach.

In the educational practice inclusive education lies on the premises of **inclusive pedagogy**, a pedagogical approach that aims to enhance learning for *everyone* in order to reduce educational inequality. It refers specifically to pedagogy and approaches to teaching, which consider diversity and individual differences part of the human condition (Florian, 2015).

Teaching and learning practices are usually not designed to provide rich learning opportunities available for *all learners*, and they often lie in the framework of integration or even special education, by only implementing approaches “that work for *most* learners, alongside something ‘*additional*’ or ‘*different*’ for those (*some*) who experience difficulties” (Florian & Black-Hawkins, 2011, p. 814).

Inclusive pedagogy does not disregard or deny individual differences between learners. The key is the provision of options, and choices by considering every possible diverse learner in the classroom ([SKATE Guidelines, 2022](#)). Approaches of inclusive pedagogy are those that provide for:

Wordcloud 1: Main elements of inclusive education pedagogical approaches



CHOICES are available to everyone.

OPTIONS for opportunities in participation and engagement are provided to all.

INDIVIDUAL SUPPORT is offered to all at any time in ways that do not stigmatise.

FLEXIBILITY during the design of the curricula and activities, as well as during implementing teaching and learning practices.

ADAPTABILITY to expected and unexpected occurrences, learning profiles, interactions, and reactions during the learning process.

REASONABLE ACCOMMODATIONS as these are defined by the UNCRPD, including the use of AT and accessibility requirements.

RESPECT TO INDIVIDUALITY in terms of the learner as human being considering disability, gender, cultural background, personal preferences, prior experiences, digital competences profile, and the use of personal AT equipment.

In research and practice of inclusive education and number of approaches and frameworks have been developed that embrace the principles of inclusive education pedagogy. The most widespread and broadly used approaches, but not the only ones, are:

- Universal Design for Learning
- Differentiated Instruction
- Collaborative Teaching

Universal Design for Learning (UDL): “make learning inclusive and transformative for everyone”

Origins:	Coming from the broader concept of Universal Design (UD) or Design for All, which is based on an architecture and engineering framework introduced by Mace (Mace, Hardie & Place, 1990) for the design and development of physical environments, and then the design of products (Michael & Trezek, 2006).
Definition:	UDL “is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn”
Introduced by:	CAST (originally Center for Applied Special Technology) with the aim to “make learning inclusive and transformative for everyone”
Premises:	Design learning having every possible learner in mind instead of focussing on how to make adaptations or provide additional or different modification for particular differences and needs.
	Design inclusive learning experiences right from the beginning and not simply making adjustments to existing processes and infrastructures.
Framework:	Design elements of educational curricula in order to respond <i>all learners’</i> diverse needs and opportunities to participate. Instructional goals, methods, materials and assessments can be customized and adjusted to meet individual needs but be available to <i>everyone</i> .
Principles:	UDL is based on three basic principles (CAST, 2022):
	Engagement: providing options for motivating and maintaining learners’ interest and effort in the learning process;
	Representation: providing options of different means of presenting content and information;
	Action and expression: providing options for various means of participation and learners’ interaction in the learning process.

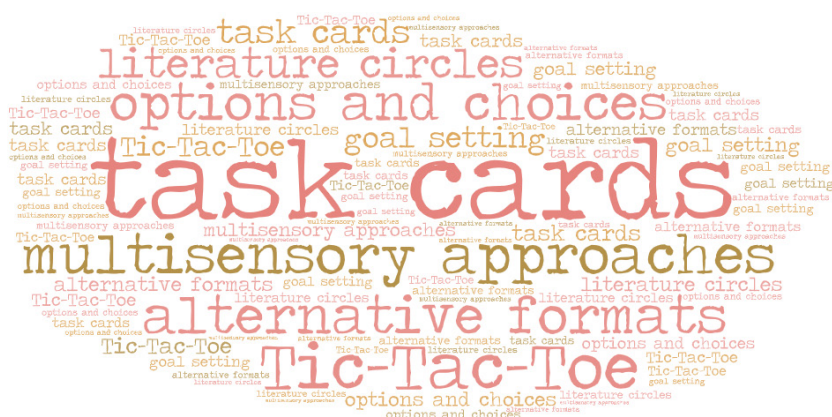
[A set of guidelines](#) is also available, as a tool used for the implementation of each one of the principles of UDL. UDL guidelines offer concrete suggestions that can be applied to any discipline or domain to ensure that all learners can access and participate in meaningful, challenging learning opportunities. In addition, CAST has also developed a set of checkpoints according to guidelines, which provide examples and ideas of choices and strategies to be implement for addressing the UDL principles.

Further analysis and implementation guidance for UDL in relation to AT is provided in *Section 3: Learning Design, Differentiation and UDL: Designing inclusive learning processes and activities with the use of technology*.

Differentiated Instruction: a tool for UDL and inclusive pedagogical approaches

Origins:	As conceptualised in inclusive education differentiated instruction or differentiation originates from the work of Carol Tomlinson (1999; 2000) who described an instructional approach that systematically takes learners' differences into account in designing learning opportunities for each student.
Definitions:	A variety of definitions during times a synthesis of which defines differentiated instruction as a flexible approach to teaching during which educators aim at responding to all learners' interests, readiness and learning profiles, due and through their diversity (Charalambous et al, 2022)
Introduced by:	Carol Ann Tomlinson with her first book in 1999. Tomlinson is considered as the guru of differentiation.
Premises:	<p>Learners have individual learning profiles, interests, preferences, personality, skills, background, experiences, etc.</p> <p>School classrooms are heterogeneous in many aspects, such as language, cultural identity, disability, socio-economic.</p> <p>Education is expected to be democratic on the basis of equal opportunities and promote social justice.</p>
Framework:	Differentiation entails adjusting the learning content, process, outcome and environment in relation to learners' readiness, learning profiles and interests (Sousa & Tomlinson, 2011).
Strategies:	There are a number of strategies for applying differentiation to the learning content, process, outcome and environment. In relation to content differentiation strategies include ways in which knowledge and information is presented, and skills and attitudes are developed. In process, differentiation strategies involve ways that children are facilitated to act, interact, collaborate. In terms of outcomes, differentiation strategies refer to ways provided to learners' to demonstrate their learning progress and results. Finally, in terms of environment, differentiation strategies involve the physical environment space and materials, the relationships between learners, the sense of safety and belonging, as well as autonomy and co-existence.

Wordcloud 2: Techniques for differentiated instruction



Collaborative teaching: shared vision, shared values, shared responsibility

Origins: Collaborative or co-teaching is traditionally connected to inclusive education. As a term, has mainly appeared to denote the relationship that special and mainstream education teachers should have in order to provide successful education to learners with disabilities (Peery, 2017).

Definitions: Co-teaching is identified as the collaboration between two or more teachers (education professionals) **who share the responsibility** of designing and implementing the learning process, including responsibility of student accountability.

Introduced by: Collaborative teaching is a strategy implemented in various ways while educators try to meet a range and diversity of students learning profiles. The term and the concept became pervasive with the evolvement of inclusive education, where approaches shifted to a more inclusive and team-work paradigm.

Premises: In the framework of inclusive education, collaborative or co-teaching has been connected to the Activity Theory Model (Engeström, 2014), which emphasizes on the needs of coordinated actions of people joining with a shared vision in order to make inclusive education a reality (UNICEF, 2015). Successful co-teaching is mainly built upon a relationship of trust, shared values and shared responsibility of all aspects of the learning environment.

Framework: Successful co-teaching is developed within the concept that both teachers are viewed as equal partners in the classroom, and they are introduced as a team. The team may frame their work in a variety of ways that include coordination, shared activities in classroom, reflective communication and joint decision making.

Strategies: Though literature outlines several models of collaborative teaching most of them shared the same basic strategies towards inclusive education summarized as:

- Common planning;
- Joint decision making on lesson design and differentiation;
- Shared objectives for each learner in the classroom;
- Shared teaching, in various models (e.g. parallel, alternate, teaming); and both teachers work with all learners;
- Learners know that teachers are a team;

- Communication from and to classroom (e.g. with parents and other stakeholders) goes commonly to and from both teachers;
- Common evaluation of the process: commonly provide feedback to all learners and reflect on own practice.



Read – Search – Consult

UNICEF’s Teacher Training Modules for Inclusive Education (2015). [Module 2: Working together to create Inclusive Schools](#)

UNICEF’s Teacher Training Modules for Inclusive Education (2015). [Module 3: Enabling environments for personalised learning](#)

[Teacher Manual of School-Based and Classroom-Based Activities To Support All Learners \(2018\)](#)

UNICEF’s Series A Rights-Based Approach to Inclusive Education for Children with Disabilities (2015)

[Booklet on Access to School and the Learning Environment II, Universal Design for Learning Booklet on Teachers, Inclusive, Child-Centred Teaching and Pedagogy](#)



Additional Resources and Tips

Activity Theory is further discussed in [Introductory booklet](#) (UNICEF, 2015),

Activity 3.1.5, in [Module 3: Enabling environments for personalised learning](#), (UNICEF, 2015), may help you to deepen understanding of situations by practicing the analysis of situations for implementing UDL

Activity 2.4.2, in [Module 3: Enabling environments for personalised learning](#), (UNICEF, 2015), aims to facilitate your reflecting on roles and tasks of an inclusion team, also relevant to collaborative teaching.

Section 1.2, School Activity 4 in the [Teacher Manual \(UNICEF, 2018\)](#) is focused on collaborative teaching.

1.4. How is AT constructed around disability conceptualisations?



Key point: The way disability is constructed over different ideologies, theories, philosophical and pedagogical paradigms, has an impact on the way AT is used in education.

Assistive technology is a multidimensional field that is affected by the approaches to disability, technological developments, the social, institutional and financial framework, educational approaches and the philosophy on education of children with disabilities and other groups of

learners. Arguably, constructions of disability do not only impact the education of diverse learners but also affect the way AT is conceptualized, provided and implemented in education (and other areas of life). This often impacts stakeholders’ attitudes, aims of AT service delivery, the legislative framework, teaching and learning practices and more.

In relation to the disability models (medical, social, human rights), technology is conceptualised as a solution that has a different target in each model, different application strategies, as well as a different anticipated outcome. Specifically in education, providing and including AT in the educational system is directly connected to an educational policy for the education of children with disabilities and to structures offered in educational settings. Table 2 summarizes how constructions of disability are linked to approaches in AT in education.

Table 2: Perspectives of AT implementation

	Medical – Charity Paradigms	Social – Human Rights Paradigm
Emphasis	The impairment as a deficit within the child (person)	The AT services in education
Difficulty/Barrier	Failure of the child to perform specific tasks	Lack of access to appropriate resources
Source of the difficulty/barrier	The impairment as a deficit within the child (person)	Learning environment does not match child’s personal aims, profile, aspirations, interests and competences
Evidence for the difficulty/ barrier	Impairment has been assessed, identified, confirmed	AT (and digital) divide (systemic, financial, digital literacy, legislative and other factors)
Consequences	Internalisation of deficit and acceptance of failure.	Internalisation of the right to AT and equal opportunities
Possible solutions	“Rehabilitation” and compensation of the deficit (impairment)	Access to AT products and services in education
Strategies	<ul style="list-style-type: none"> • Medical evaluation • Special therapy and rehabilitation • Special education • AT to ‘substitute’ the impairment 	<ul style="list-style-type: none"> • Development of comprehensive AT service system • UDL • AT to be integrated in the inclusive education policy and practice framework
Outcome of the strategies	<ul style="list-style-type: none"> • Individual benefit in terms of functionality • Total dependence on ‘special’ and segregative education • Patient and ‘special needs’ identity 	<ul style="list-style-type: none"> • Focus on institutional, environmental, social, financial, instructional, attitudinal and other barriers • AT as a tool for removing barriers in the learning environment
Expected outcomes	<ul style="list-style-type: none"> • Improvement of functional efficiency • Individual adjustments • Return to individual learning tasks 	<ul style="list-style-type: none"> • Equal opportunities • Freedom of choice • Digital (AT) competence development • Increased opportunities for interaction and participation in learning

1.5. Inclusive Digital Education



Key point: Inclusive Digital Education holds the same premises as inclusive education.

The rapid advancements of digital technology are gradually transforming all aspects of our lives including education. Digitalisation of education, i.e., structuring education systems and processes around digital communication, digital media and infrastructure, has led to a broader concept of education, currently established under the term Digital Education. In general, this entails the innovative use of digital tools and technologies during teaching and learning. Other terms, such as digital learning, or digitally enhanced learning, or e-Learning, or technology-enhanced (or supported) learning are used in relevant literature. Digital education is identified in multiple learning delivery modes, including in-person, distance and hybrid, as well as in different modalities, including face-to-face, online learning and blended learning. AT and accessibility hold an essential role in the design, development and implementation of digital education in order to make this barrier free and available to all learners.

According to the European Agency of Special and Inclusive Education (2022),

“ Inclusive Digital Education is defined as digital transformation that goes far beyond applying suitably designed digital technologies in education. Inclusive digital education involves all education system levels – from the individual to the educational institution, to the regional or national level. In inclusive education systems, this entails addressing inclusion, exclusion, digitalisation and the digital divide as interconnected and inter-dependent cross-cutting issues. This is vital if digital education is not just to be implemented for some but is to be permanently anchored in the education system’s structures to foster resilient education systems that provide equitable education opportunities for all learners” (p.8).

Digitally inclusive education is affected by global, national and local factors that are composed of both the ideological and political backgrounds of education, but also the design and development foundations of an educational setting. In order to set the goals for a digitally inclusive school, a number of parameters need to be considered at a macro-level (i.e. theories, conventions and philosophies, ethical codes) at a meso-level (i.e. programs and services development) and at a micro-level (i.e. in terms to implementation in the learning practice) (Mavrou & Hoogerwerf, 2021; European Agency for Special and Inclusive Education, 2022).

At a macro-level, parameters consist of institutional and legal frameworks at global, regional and national Level, which determine assistive and digital technologies as matter of human rights and an issue if equality and social justice.:

- the [UN CRPD](#),
- the [European Accessibility Act](#),
- the [Digital Education Action plan](#),
- the [United Nations \(UN\) 2030 Agenda for Sustainable Development](#),
- the [Global Report on Assistive Technology](#).

In addition, ethics codes and data protection directives such as the [GDPR](#) are also relevant, especially with the outbreak of innovative technologies such as Artificial Intelligence and robotics.

At a meso-level, factors focus on teachers and learners, educational institution and technology.

- For both teachers and learners, **digital competence** development seems to hold a central role. Connected to the concerns on the widening of the digital divide, there is an increased interest on digital competence frameworks, some of which are more specific on the use of AT (see [ENTELIS+](#), [ATLEC](#), [KPT](#)) and digital AT for inclusive education (see [DigCompEdu – Area 5](#), [SKATE](#)). Also, the role of teachers and learners is highlighted in terms of collaborations and involvement in the design of learning activities with the use of technology.
- At the level **of educational institution**, the European Agency for Special and Inclusive Education, (2022) highlights that schools must undertake own measures for digital transformation through a whole school approach, in order to empower teachers to embrace inclusive digital education in various modalities. Teachers' attitudes remain a major issue. The shift required is often vast, while support and resources are limited.
- Finally, at the level of **technology**, when referring to 'end-users' or target groups, often a medical model perspective is observed, while AT is largely viewed as a compensatory means. Nevertheless, new and innovative technologies seem to have a significant potential for the education of children with disabilities, though most of them are not reaching the classroom practice. Standards and quality are also currently a trend in discussions about research, design, development, implementation and evaluation of technology for the purposes of inclusive education.

At a micro-level, inclusive digital education seems to heavily rely on the implementation of differentiation and UDL. Digital and AT is valuable for providing flexibility, options and control to users, and for re-defining the learning process to a meaningful experience for all.

the challenge is how all these are coming down to the design of educational programmes and services, and more specifically to get them effectively to the microlevel of the classroom practice. And these challenges are not actually different than the challenges identified for promoting inclusive education in general.



Read – Search – Consult

What does literature say about Inclusive Digital Education?

Read the [European Agency for Special Needs and Inclusive Education \(2022\) Literature Review Report on Inclusive Digital Education](#)



Additional Resources and Tips

[Section 2](#): Assistive Technology: Identifying, selecting and using AT, is dedicated in strategies for the use of AT for inclusive education. Going through the section try to make the connections with the role of technology for successful inclusive pedagogies.



Think – Reflect – Act

Here are some activities for reflecting on own attitudes, understanding and practices of the contents of Section 1

1. Why is understanding constructions of disability is important for education?

As mentioned in sub-section 1.1. the way disability and diversity are conceptualised through the various models and ideologies, impacts the perspective educational systems and educators hold for which is an appropriate educational approach for diverse learners.

Try to match/elaborate on the educational models below with possible teaching and learning approaches and underlying disability models?

Exclusion	Segregation	Integration	Inclusive Education

2. How is UDL considered as an approach of Inclusive Pedagogy?

Try you draw a grid that shows the relationship?

Inclusive Education Premises	Universal Design for Learning

3. Ready for an initial self-evaluation of your own school/learning setting?

Try out the [ENTELIS self-assessment tool for schools](#) [English].

The tool is intended to help teachers and school teams to reflect on how your school is doing with regard supporting students with disabilities (and not only) in the development of ICT and ICT-AT skills. The aim is to identify the school culture, policies and practices in terms of digital inclusion. Through a questionnaire with sets of descriptors/indicators, the tool will help you identify any good practices in your school, and the areas in which your school should increase its efforts in order to increase outcomes. Indicators/descriptors are organised in areas.

It has too versions: the short and the extended version.

Short version: includes a broad descriptor of good practice for each area, **which is the one recommended to try out at this stage.** It also includes a short worksheet for identifying gaps.

Extended version: includes four descriptors of good practice for each area. The extended version also includes typical questions that help you to understand the criteria and to assess at what stage of achievement you are. It further provides guidance in the definition of an action plan. In that case the worksheets provided will become collaboration tools between staff members. **Keep this for the end of the Guide!**



Section 2: Assistive Technology

Identifying, selecting and using assistive technology



Overview

The [Global Report on Assistive Technology \(WHO, UNICEF, 2022\)](#) emphasizes that ‘access to assistive technology for children with disabilities is often the first step for childhood development’. The report focuses on basics of AT in terms of identifying and selecting appropriate AT for learners in collaboration with other stakeholders, as well as developing skills for setting up and operating some AT products and accessibility requirements. Paying attention to provisions and use of AT for children is particularly important, as their needs and conditions are constantly changing during growth. Technology has a huge potential to increase opportunities and remove barriers in the education of all children, increase functionality and access to physical and digital education settings and environments for children with challenges in functional skills, and increase opportunities for learning and participation. AT supports the right of children to education, while at the same time access and use of AT in education should be regarded as a human right for children that would benefit from it. Collaboration and engagement of teams involving various actors and stakeholders in the whole process of identifying needs, selecting and implementing AT is essential. These are teachers, other school staff, family, service providers.



Can do: Competences relevant to this section

Main assumption: Teachers need to be empowered in choosing and integrating AT in the design, development and implementation of learning activities based on inclusive pedagogies.

- To consider the use of AT as a tool for removing barriers in the various aspects of the learning process design.
- To have knowledge of basic AT that can be used in the classroom
- To recognize basic common AT solutions for particular children’s needs.
- To search and identify/select AT and accessibility resources for the particular needs of individual learners.
- To set up, configure and implement common/basic assistive technologies and specific equipment used by specific learners

- To validate the appropriateness of the AT used by the learners
- To provide positive role models of using technology solutions by teachers
- To create accessible materials to support children participation in learning.
- To know and use reliable sources of information and resources about AT solutions at local/national level and international level.



Know – Understand – Analyse

Key points to remember

AT is identified as multifaceted concept, and dynamic and largely interdisciplinary field, designated in human rights promoted by global agendas and conventions

Selection and provision of AT in education is a systematic process requiring teamwork with the children/learners in the center.

There are abundant resources and products for AT in education which need to be carefully examined and aligned to learners requirements, expectations and aspirations, as well as the learning environment and delivery modes.

2.1 Definitions, terminology and global situation in relation to AT



Key point: AT is identified as multifaceted concept, dynamic and largely interdisciplinary field, designated in human rights promoted by global agendas and conventions.

AT often refers to technology products as well services and systems in order, enable people to live healthy, productive, independent lives with dignity and to participate in education, the labour market and civic life. The [Global Report on Assistive Technology \(2022\)](#) (p. 6) identifies two of the main definitions that are gaining more ground in the sense of developing a more common understanding and language around AT: the WHO definition (Box 3.1) and the ISO definition (Box 3.2) in this Guide both definitions seem relevant. The WHO definition (Box 3.1) provides coherence of the Guide with the global perspective. It also highlights well-being, an aspect particularly essential for children and is comprehensive referring to both products and services. The ISO definition (Box 3.2), though is more specific to products and functionality, identifies AT as a tool for participation, which is central in the framework of inclusive education.

Box 3.1. WHO definitions

Assistive technology is the application of organized knowledge and skills related to assistive products, including systems and services. Assistive technology is a subset of health technology.

An assistive product is any external product (including devices, equipment, instruments or software), especially produced or generally available, the primary purpose of which is to maintain or improve an individual’s functioning and independence, and thereby promote their well-being. Assistive products are also used to prevent impairments and secondary health conditions.

Source: Priority assistive products list. Geneva: World Health Organization; 2016 (<https://www.who.int/publications/item/priority-assistive-products-list>, accessed 20 April 2022).

Box 3.2. ISO definition

An assistive product is any product (including devices, equipment, instruments and software), specially produced or generally available, used by or for persons with disability for participation; to protect, support, train, measure or substitute for body functions/structures and activities; or to prevent impairments, activity limitations or participation restrictions.

Source: Assistive products for persons with disability — Classification and terminology (ISO 9999). Geneva: International Organization for Standardization (ISO); 2016 (<https://www.iso.org/standard/60547.html>, accessed 20 April 2022).

Terminology

Often the terminology used for and within AT varies depending on the scope and the context. Figure 3 summarises some terminology distinctions.

Figure 3: Variations of technology related terminology

Assistive Technology

Focused more on functioning

High-tech

More complex electronic or digital technology

Hardware / Equipment

The physical component

Off-the shelf

You can just walk in a store and get it

Tools

The means for performing a task

Educational Technology

Any technology used in the learning process

Low-tech

Simple non-digital, non-electronic or very simple electronic technology

Software / Apps

Instructions, procedures and programmes that perform various tasks

Customised

Created specifically or personalise for the user

Devices

The technology artefact itself

Check this out - Brainstorm

Using the right terminology depending on the context there may be of crucial impact (Case 1). In other words, terminology conceptualisation and interpretation to practice and decision making depends on policy, funding mechanisms and schemes, prevailing approaches and constructions of disability and diversity in general.

Case 1: Educational or Educational Technology? Or is it 'special equipment'?

What is funded and what is not? Who is eligible and who is not?

Luis is 10 years old. At school he is facing some challenges in reading comprehension and spelling. The teacher realised that when they use **educational technology** in the classroom his interest and participation is increased. Such technology may include recordings, videos and writing group assignment using the one computer of the classroom. Thus, the teacher in collaboration with the parents proceeded in requesting an extra laptop in the classroom with some applications for practicing spelling, reading text aloud and children friendly word processors. In her request she included Luis' case to document the need for the class and for Luis.

Country 1:

The request was rejected. The responsible Ministry stated that their scheme funds only **'special equipment'** for children with *'special needs'*, that would go through the process of a medical and rehabilitation assessment for prescribing equipment.

Country 2:

The request was returned. The responsible Ministry stated that their scheme funds only **'assistive technology'** that would support the individual needs of any child is assessed through the AT system by a multi-disciplinary team. Luis can be eligible for a laptop, a text-to-speech, a speller and some supporting apps, but a referral should be submitted to the service providers.

Country 3:

The request was positively responded. The local educational authority provided funding to the school for acquiring an additional laptop computer and the local AT and inclusive education resource centre staff collaborated with the teacher in order to identify appropriate software applications for Luis and the rest of the class.

Additionally, distinction between two terms can be on a very thin line and unessential. For instance, differentiating devices from tools is important in technical terms, but it may not be important for the final objective: use the devices as tools for promoting inclusive education.

Given the discussions on Inclusive Digital Education in view of the digitalisation of education and the role of digital and AT for inclusion in digital learning, new terms and concepts emerge. Some of the most widely used terminology especially during the last decade, and more intensively after the outbreak of the COVID-19 pandemic include terms such as digital divide, digital inclusion, digital competences and skills, digital accessibility, accessible mainstream technology, that are also used in this document.

In conclusion, looking into definitions, terminology and language in AT is significant in terms of establishing a common basis and a common understanding, while concepts become meaningful in the current context.



Read – Search – Consult

Interested in more definitions and terminology in relation to digital inclusion, digital learning and digital accessibility?

The [ENTELIS Network](#) has developed the [ENTELIS+ Glossary of Terms \(2021\)](#), that is actually an updated version of the first ENTELIS project Glossary and Taxonomy.

See also [UNICEF's Glossary](#) in Accessible Digital Learning Portal



Think – Reflect – Act

Some more thinking linking Sections 1.1, 1.4 and 2.1.

1. Which models of disability and AT constructions are represented in each of the three different countries' response in Case 1?

Create a connection table if you find it helpful

Ecosystem for AT provision

As mentioned in the introduction, AT is gaining more attention during the last decade and has been move high on the global agendas. Most of the initiatives and efforts at a Global and Regional level are not directly connected to inclusive education. However, they provide the foundations on which UN and EU member states can build inclusive education policies and educational systems that will encompass provisions for AT, educational staff training and support as well as monitoring of implementation and follow-up. Therefore, teachers and school teams are encouraged to be aware of such advancements which are useful for developing AT inclusive attitudes and culture.

The most important global and regional initiatives on AT are looking into systems, barriers and access to AT through the [5Ps framework for improving access to AT](#) (Figure 4), developed by the World Health Organisation (WHO). The 5Ps framework analysis access to AT from the perspective of People, Policy, Products, Provision, and Personnel.

WHO has also identified the AT provision process in four steps ([Video 1](#)), in order to support countries develop their own systems.

Along the same lines **UNICEF** in collaboration with the WHO ([Video 2](#)) has turned attention to AT for children, showing the way for action, by identifying the main barriers to AT specifically for children and by highlighting the benefits of the use of AT.

Figure 4: the 5Ps framework for improving access to assistive technology



In the **European region**, declarations (e.g. the [Bologna Declaration on Unlocking Human Potential, Video 3](#)) have been launched to endorse the role of AT in Human Rights. The **European Commission** has also turned attention of member state's policies to an aspect of AT that is more focused on accessibility through the [European Accessibility Act \(Video 4\)](#) and the [EU Directive \(EU\) 2016/2102 on the accessibility of the websites and mobile applications of public sector bodies](#).

A brief overview of the current situation

The aforementioned Global and Regional efforts aim to provide a framework for countries to develop their own AT service delivery systems. However, in many countries there is no coherent AT service delivery system, or there is a total absence of such a system/service⁴. These challenges are one of the main reasons for WHO to develop the 5Ps framework presented above (Figure 4).

Despite the inconsistencies and challenges, in most of the countries around the world there seem to be State institutions, NGOs, private initiatives and/or other types of organisations that are involved and promote in any available means, the assessment and provision of AT. There are a number of models and frameworks created to facilitate consideration of AT by involved teams, through a more systematic process and all of them share **the main principles identified by the 5Ps Framework of WHO:**

- **Person-centered** processes.
- Respect to **individual preferences** and human dignity.
- **Teamwork**, collaboration and multi-disciplinarity in assessment and decision making.
- Structured but **flexible**, non-linear approach.
- **On-Going**: follow-up and implementation planning is part of the process.

At the level of research and professional work, a number of frameworks have been developed to guide AT teams in assessment, implementation and follow-up of the use of AT for persons of all ages. These are briefly presented in [Sub-section 2.2](#), where emphasis is placed on those that seem more relevant to education.



Read – Search – Consult

Interested more on what is going around in the international arena in relation to AT?

International Level Initiatives

The WHO in collaboration with UNICEF and other global stakeholders and researchers have developed a number of resources and materials to promote provision of AT. You may consult some of these:

[Priority Assistive Products List](#): a model of AT products list from which states can develop a national priority assistive products list according to national need and available resources

[Assistive Products Specifications and how to use them](#): A guide to procurement of assistive products, primarily for procurement teams working in less resourced settings

[Global priority research agenda for improving access to high-quality affordable assistive technology](#)

⁴ [Global Report on Assistive Technology](#), the [WHO European Region assistive technology report \(WHO, 2021\)](#) and the [European Disability Expertise \(EDE\) country reports on Disability Assessment](#)

[Rapid Assistive Technology Assessment tool \(rATA\)](#): A population-based survey tool to be used only for rapid mapping of need, demand, supply, and user satisfaction with AT

UNICEF (2015) [Assistive Technology for Children with Disabilities: Creating Opportunities for Education, Inclusion and Participation](#)

[Global Alliance of Assistive Technology Organizations \(GAATO\)](#) and the Report on [AT Outcomes and Impact – A Global Grand Challenge](#)

European Level Initiatives

The [European Accessibility Act](#) is “a directive that aims to improve the functioning of the internal market for accessible products and services, by removing barriers created by divergent rules in Member States”

[Association for the Advancement of Assistive Technology in Europe \(AAATE\)](#) launched in 2019 the [Bologna Declaration on Unlocking Human Potential: A Call for Action to Improve Access to Quality Assistive Technology for Realising Fundamental Human Rights and Achieving the Sustainable Development Goals in a Fully Inclusive Manner](#): endorses AT as a matter of human rights and identifies ten specific points as an agenda for action.



Additional Resources and Tips

Check out some videos of global and European initiatives for AT:

- [Video 1: Improving access to AT: the 4 steps to service provision](#)
- [Video 2: WHO and UNICEF partner to bring quality AT](#)
- [Video 3: The Bologna Declaration](#)
- [Video 4: European Accessibility Act](#)



Think – Reflect – Act

From Global and Regional to Local initiatives. What is the situation in your local context?

1. Make a list of main National initiatives in your country in relation to the promotion of AT.

- Which of these are related or informative for your work in education?
- Check your responses on ENTELIS self-assessment tool for schools in Section 1 which you completed in collaboration with your school principal and colleagues.
- How can these policies/initiatives help your school for AT and digital inclusion based on your ENTELIS self-evaluation exercise?
- What is missing from this initiative at national level that you would expect in order to further increase your school’s capacity?

Local Initiative	Relevance to education	Helpful for your school setting	Missing issues

Make this a share document and collect information collaboratively!

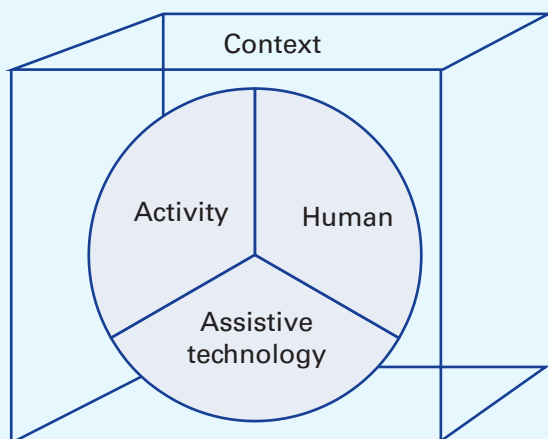
2.2 Frameworks and Tools for AT Assessment in Education



Key point: Selection and provision of AT in education is a systematic process requiring teamwork with the children/learners in the center.

There are several models to consider AT provision, selection and implementation. Assessing learner’s needs and requirements in terms of AT is part of a broader AT service delivery system. AT assessment models are adopted and adapted according to context, different professionals’ teams and different sectors. They are used in combination with a variety of assessment tools, either suggested specifically by a model or are available through other mechanisms. The most commonly used frameworks are illustrated in Boxes 4.1, 4.2, 4.3.

Box 4.1: HAAT Framework of AT



From Cook, Polgar, & Encarnaçao (2020)

Context:

- Physical, social, cultural and institutional factors

Activity:

- Type of activity and personal meaning ascribed to it
- Why and how it is performed
- Time and frequency

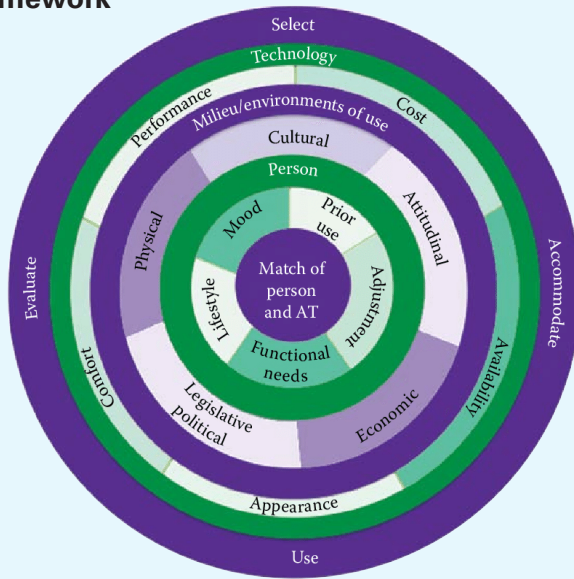
Human:

- Physical, cognitive, sensory, attitudinal characteristics
- Goals, abilities & preferences
- Technology experience

Assistive Technology (AT):

- Human-Technology interaction
- Interface
- Processing
- Activity outcome

Box 4.2: Matching Person & Technology Framework



Original from [Institute for Matching Person & Technology \(IMPT\)](#)

The MPT process contains a series of instruments (self-report checklists about consumer predispositions to and outcomes of technology use) which take into account

- the environments in which the person uses the technology,
- the individual’s characteristics and preferences, and
- the technology’s functions and features.

Environmental Factors

- Availability & affordability of products & professionals
- Opportunities & services
- Social & economic priorities, Legislation & policies
- Attitudes and support from family friends and others

Personal Factors

- Experiences
- Knowledge and information
- Expectations of benefit
- Personal Preferences & Priorities

Making & Selection

- Assessment of functional needs
- Assessment of predisposition

Device Comparison & Trial

- Device ratings
- Desired device modifications
- Training needs/desires
- Written plan

Follow-Up

- Use
- Realization of benefit
- Enhanced performance of activities
- Enhanced participation
- Subjective well-being

Box 4.3: SETT Framework

Student
Environment
Tasks
Tools

Source: [Joy Zabala website](#)

The Vision: Students with diverse abilities, needs, and experiences in various educational environments use a plethora of tools: 1) to accomplish tasks that lead to educational achievement and, 2) as a means to demonstrate achievement

Learner Attributes

- Physical, Learning, Cognitive
- **at a spectrum of abilities**
- Language/Communication
- Social/Emotional
- Experience

Environment

- Physical/Technical
- Personal
- Conditions

Tools:

- Devices
- Services
- Strategies

Tasks:

- What the learner must do
- Individual goals
- Involvement and participation

Even though, all frameworks presented in Boxes 4.1, 4.2 and 4.3 have been tested and used with reliability and trust for many years in different systems, in this Guide emphasis is placed on the SETT framework. The SETT framework originating from the field of education, is considered closer to the requirements of examining AT in educational settings, and it is also considered pertinent with regards to teachers' understanding of the process.

SETT is a four-element model intended to promote collaborative decision-making in all phases of AT service design and delivery from consideration through implementation and evaluation of effectiveness. During the process of assessment of learner's needs, especially in relation to functionality and interaction with technology SETT is also compatible with other Frameworks (e.g., HAAT and MPT) in the sense of examining particular aspects of the use of AT, and this is one of the reasons multi-professional and inter-disciplinary collaboration is vital. Teachers have an essential role (Figure 5) in this collaboration. The SETT framework aims to help teams involving teachers to choose and plan for AT, examining each of the four elements through the following strategies:

Figure 5: Why is SETT and AT assessment relevant for the teacher

Collect information

Sudent: specifically related to the student

Environment: related to anything and or anyone around the student in places where technology is expected to be used

Tasks: about what actually happens in the environments

Teacher's role

source of information

plan, apply, evaluate

collaborate

co-decide

Tools: AT and relevant approaches to participate in

Tasks happening in all school

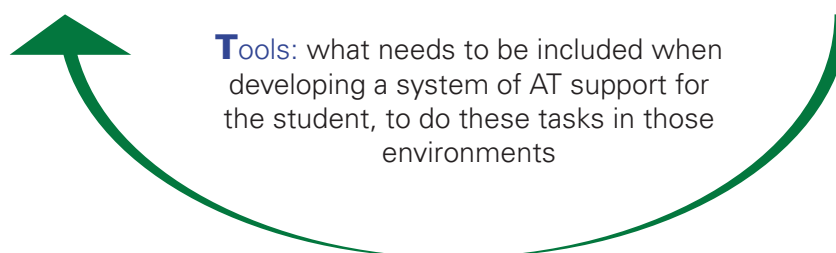
Environments in order to include all

Students

Try and select

Tools: what needs to be included when developing a system of AT support for the student, to do these tasks in those environments

Follow-up & re-evaluate





Read – Search – Consult

What are the available tools for guidance in the process of collecting information, considering, trying and selecting AT?

The SETT framework holds a set of tools namely the SETT Scaffolds. These aim to facilitate:

- [Consideration of AT Needs](#): A tool to help teachers and teams to observe each area of the student development and activity, consider functioning for areas of concern in all environments and summarise possible AT and services with an initial plan including responsible parties and timeframe.
- [Collection of Data](#): A tool to help teams collaboratively collect and analyses information for the Student, the Environment and the Tasks from a Variety of Sources
- [Selection of AT Tools](#): A tool to help teams to develop descriptors and specifications in order to identify possible AT tools, prioritize them based on the data collected and identify service required for effective use and persons involved.
- [Development of an Implementation and Evaluation Plan](#): A tool to help teams to plan for action, activities, strategies, additional accommodations, evaluation elements, links with students learning programme and curricula for the implementation of AT.

You can have a look at [other useful resources and readings on SETT](#) on the Joy Zabala website.

The [WATI \(Wisconsin Assistive Technology Initiative Development Team\)](#) has also developed a set of tools and scales to guide teams focusing on AT for students through the process of identifying needs and barriers, defining objectives, selecting tools and planning for implementation. The WATI resources are in line with the SETT framework and integrate SETT scaffolds in a comprehensive WATI Guide to AT assessment.

- [WATI Publications](#) include all [tools and forms for each area of assessment](#), forms for decision making and [selection of AT and tools for planning and implementation](#). Forms are explained in detail in [separate chapters per are and step of the process](#). However, as each country holds different systems for the provision of AT, the use of any tool should be contextualised taking into account: educational authorities (e.g. centralized, local, school based), assessment teams (e.g. national centres, school based teams, professionals involved), family/student rights and involvement (e.g. some countries' policies allow less family involvement in decision making, families rights to appeal decisions), educational systems and curricula (e.g. sub-tools of frameworks maybe or not be relevant to particular curricula and education system highlights)



Develop ideas

Case 2: Meet Greg (*to be continued*)

Greg was born with cerebral palsy. He enrolled the public kindergarten school of his neighborhood and at the age of 7 years he went to primary school, attending a special unit. A special unit is a small classroom in the premises of mainstream school, with a small number (no more than 6) of children with disabilities of different ages. Children attend their unit curriculum and are integrated a few ours in the day in the mainstream classrooms. Greg was moving around using a manual assistant-controlled wheelchair.

Being enthusiastic about school and learning Greg preferred to be included in the mainstream classroom most of the school day. He was keen to participate in all activities and to communicate with classmates and teachers. He had no verbal communication, which teacher and school team considered a big challenge. The educational system had no AT services, and teachers were not aware about AT and alternative ways for communication. Family linked to external professionals and started preparing some communication cards, but school still found that a challenge.

At the age of 12 he was referred by the school for assessment in order to '*be provided with computer solutions that could possibly help his communication and learning*'. By then, the educational authorities initiated an unofficial process for '*specialised technology equipment*' for children with disabilities ([see Case 1](#)).

In the following a summary of how the SETT Framework was implemented is presented:

The process:

Collection of Information - Data:

existing disability and education reports, interviews with Greg, family and professionals working with him at the time

Assessment: in two phases in various settings

Approaches: SETT, with HAAT elements for control interface interaction, & WATI tools

The team - people involved:

Greg, mother, educators, speech and language therapist, physiotherapist, AT specialist

Decision Making - Tools and Services:

Phase 1: Initial AT suggestions – Follow-up leading to
Phase 2: AT Suggestions and continuous support

The data: Student – Environment – Tasks (Phase 1)
Areas of Consideration

Areas of Consideration	
Mobility & Physical	Assistant controlled manual wheelchair Moving around with equipment Severe difficulty in controlling any movement Technology- Access/Selection: existing laptop computer with no alternative access. Ability to follow visual and auditory scanning for using a switch.
Vision & Hearing	No challenges
Learning & Cognition	Literacy: visual recognition of limited words Pictures and Symbols: Excellent understanding Comprehension: Excellent response, ability to select Memory: Excellent skills
Communication:	No verbal communication Eye movement and head movement for YES/NO
Services & limitations:	Resources: Limited and specific budget, use existing technology Revisiting trials: No video permitted by the authorities Language: Limited options for alternative communication systems in national language

[To be continued in Section 2.3](#)

The decision: Tools (Phase 1)

AT to support communication and learning based on data:

- Switch accessible software (Clicker5) and single access switch
- To be installed on existing Laptop computer (resources limitations)

Implementation Plan:

- Learner training for switch use
- Teachers’, assistant’s and family training
- Definition of individual sessions and classroom integration plan



Additional Resources and Tips

- There are some **basic issues for AT Assessment** that apply regardless model and approach. [Annex 1](#) presents a short guide to the assessment process. You may not be the main person/provider/service conducting that assessment, but you are definitely part of it! It’s good to know!



***Coming together is a beginning.
Keeping together is progress.
Working together is success.***

Henry Ford

- **Teamwork** in the AT process is essential. Anyone working with the student can be and should be part of the AT team:
 - Student is not only in the center of the process but also a collaborator! Family too.
 - AT specialists and service providers may coordinate the process
 - Teachers are data and information providers, involved in the decision making and of course in the implementation and follow-up.
 - Other professionals such as speech and language therapists, occupational therapists, social workers, psychologists, physiotherapists, etc.
 - The team may also need to include and consult with Experienced Users of AT, Disability Representative Organisations, Funders, Manufacturers and Designers
- AT decisions for implementation include more issues and details with regards to accommodations, adaptations and set-ups. Revisit decisions after reading [more in Section 2.3.](#) and designing learning with AT in [Section 3.](#)

2.3. AT for access, communication and learning in education



Key point: There are abundant resources and products for AT in education which need to be carefully examined and aligned to learners' requirements, expectations and aspirations, as well as the learning environment and delivery modes.

AT products and resources are often grouped in various ways and criteria. These maybe by type of disability and impairment (e.g., physical and sensory disabilities, learning disabilities), or by type of activity (e.g., for writing, for communication, for reading, for mobility), or by type of technology (e.g. low-tech, mid-tech, high-tech) or even the perspective under which it is implemented (e.g. according to Abbot's (2007) taxonomy to train, to support learning, to enable learning). In this section the focus is on technologies for supporting inclusive education in terms of participation and interaction for learning. Without disregarding the importance mobility and rehabilitation for inclusive education, relevant technologies are not included here. However, it is highlighted that assistive technologies for functional empowerment and assistive technologies for learning are interdependent. Not being able to physically access the school premises or the digital learning environment, is a primary factor of education exclusion. Thus, though mobility technologies are not discussed in this Guide, low tech and digital technologies for physical access and control interfaces are listed as examples, together with software and applications for participation in the learning process.

Before presenting some examples of Assistive Technologies, it is useful to remember [definitions](#) and [terminology](#) and clarify that in this guide:

No-tech: do not entail any specific equipment but it includes adaptations, procedures and services for changing existing conditions and environment (e.g., coloured paper, pencil grip, extra time, tasks lists, or an interpreter)

Low-tech: simple and often low-cost equipment that does not have a partially mechanical aspect but don't require a power source (e.g., communication books, magnifying glasses, symbol charts, etc).

Mid-tech: are more complicated mechanical devices, with not sophisticated electronic component and may require power source (e.g., battery operated communication devices, simple alternative mice and keyboards, talking calculators)

High-tech: often computer based and digital equipment, more complex that may need extensive training to be used (e.g., eye-gaze control interfaces, tablets-based communication devices, CCTVs, etc)

In the following boxes examples of AT that can be used in education are provided. The examples are of course not exhaustive and due to rapid technological advances, they may change and updated often. In addition, together with examples some issues of considerations are provided when setting up and using this technology in the classroom. Students may need some adaptations and modifications on the spot when starting using a device. Teachers need to be prepared for addressing some basic issues and be aware of how and where to seek support to do so. Some things that may seem a detail in technology configuration can be very important in relation to accessibility and using the full potential that AT may offer.

Assistive Technologies for physical access to learning and technology

Box 5. Access & Control Interface

Keyboards and mice are the most common devices for interacting with computer technology and other devices. For many students with physical, sensory and cognitive disabilities, or students facing fine motor and coordination challenges, or younger students standard mice (pointing devices) can pose challenges. Thus, there are a number of alternative options for controlling and computer or tablet device which offer different possibilities to diverse learners. For the use of the different alternative input devices there are also some basic issues for consideration.

5.1. Alternative pointing devices

Pointing devices are more or less mouse functioning-like devices. They may be operated by different parts of the body and require individual modifications. Some examples are trackballs and joysticks, as well as more high-tech devices such as head control, mouth mouse, eye-tracking and touchscreens (sometimes adapted with stylus). Mouse simulation technology is also an example, where functions of a mouse are simulated through a software, controlled by other means such as keystrokes

Some issues for consideration

- means of device activation (body part),
- pointer size,
- pointer/movement speed,
- selection type (e.g., dwell or click),
- selection speed
- gripping and additional adaptations,
- sensitivity of touch and movement,
- range of movement,
- visual-motor coordination.

Examples and tools:

- UNICEF Accessible Digital Learning Portal: [Low-cost hardware for access](#)

<p>5.2. Switches</p>	<p>Some issues for consideration</p>
<p>Switches allow students to control their devices with less complex movements. They are not pointing devices, as they do not directly control the movement of a mouse pointer. Rather to be used they often require indirect access through a scanning software/application. Switches come in a variety of shapes and sizes depending on the action used to activate them. Some examples are sip-puff switches, press/push switches, pull and string switches, blinking or squeezing. They can also be from different material, e.g., soft, waterproof, membrane, depending on activation method.</p>	<ul style="list-style-type: none"> ▪ amount of force required to operate/ adjusted if possible ▪ activation method – body part: a switch can be operated by almost any body part that is able to produce consistent and voluntary movement ▪ use of one or more switches ▪ scanning configurations: type (visual/ auditory) and speed of scanning, colour and appearance, single or group scanning, auto or controlled scanning ▪ size and surface ▪ adaptations with visual cues
<p>Examples and tools:</p> <ul style="list-style-type: none"> • Video: NHS Bristol- Switch Scanning 	
<p>5.3. Alternative Keyboards</p>	<p>Some issues for consideration</p>
<p>Keyboards may vary in sizes, numbers of keys, overlay appearance and flexibility. Some examples include larger-key and high contrast keyboards, early learning visualized keyboards, braille and concept/programmable keyboards. In addition, on-screen (virtual keyboards) are also a type of alternative options, which are operated by devices described in boxes 5.1 and 5.2.</p>	<ul style="list-style-type: none"> ▪ size and order of keys ▪ letters/symbols on the keys, ▪ use of one or two hands, or other activation mean ▪ need of enhancement (e.g. stylus), ▪ repeat rate and accidental strokes, ▪ removable, changing or programmable overlays ▪ use of keyguards ▪ colour-coding of keys
<p>Examples and tools:</p> <ul style="list-style-type: none"> • UNICEF Accessible Digital Learning Portal: Low-cost hardware for access 	
<p>5.4. Other input technologies</p>	<p>Some issues for consideration</p>
<p>Other access and control interface technologies include speech recognition, or even more advanced technologies such as brain control interfaces. Speech recognition, is known as speech to text and is becoming an integrated accessibility feature in mainstream technologies as well (e.g. Dictate in MS Office applications)</p>	<ul style="list-style-type: none"> ▪ language availability may be an issue ▪ training of student and software ▪ be in a quiet place ▪ use a microphone where possible ▪ enter main body of text, and then use other options for editing ▪ provide instructions and strategies (e.g. for brainstorming, drafting)
<p>Examples and tools:</p> <ul style="list-style-type: none"> • Dictate in Microsoft office with speech recognition: Microsoft Dictate • Voice commands on PC (Speech) or mobile devices (e.g, Voice Access) • Speech recognition in Google Docs (speech to text) • Search Google by voice: Google Assistant 	

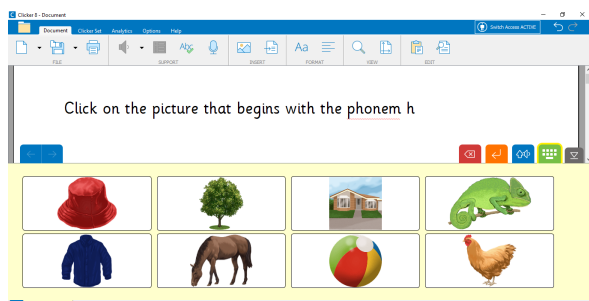
5.5. Technology output	Some issues for consideration
<p>Access to technology and information is also related to the output of students' interaction with technology. This often entails accessibility of mainstream technology as well as AT that provides alternative means of output. Such technologies include readers (text-to-speech and browsing readers), magnification and content enlargement, colour contrast adjustments, tactile output, symbolization and visualization. More on accessibility in Box 8 and Section 3. These technologies can either be specifically developed assistive technologies or embedded accessibility in mainstream technology. However, there is always the need to check if embedded accessibility meets the student's needs, and how other individual AT is compatible with that.</p>	<ul style="list-style-type: none"> ▪ language maybe an issue in the use of text readers as well as communication devices ▪ some accessibility adaptations can be found as embedded features in mainstream technology ▪ more specific and customized options are available by AT products ▪ braille displays need braille knowledge ▪ symbols and visualisations can be generic or supported by specific symbol sets. If so need to be aware of the symbols students are familiar with ▪ type of magnification and enlargement (e.g. in line, in window, portable device, digital and hard copy materials) ▪ compatibility and interoperability of individual AT and mainstream technology accessibility features
<p>Examples and tools:</p> <ul style="list-style-type: none"> • Windows accessibility: Narrator, magnifier and more • Non-visual access to computer: e.g. NVDA • Accessible digital publications: Daisy Consortium 	



Develop ideas

Case 2 (continued): Remember Greg?

In Phase 1 of his assessment Greg was provided the following AT. Decision took into consideration all data collected, including funding and resources limitations.



Switch accessible software to be installed on existing Laptop computer (Clicker5)

Issues for consideration based on the HAAT framework:

Control interface: Big Red Switch (wireless adaptor)

Access method: Visual and auditory scanning

Selection set: pictures (illustrations)

Output: Recorded voice (no synthesized voice in national language at the time)

Mounting: Desk mount for switch & Cover laptop-rest

Questions to help implementation:

- Who needs to be involved and trained?
- What aspects need to be targeted in training?
- How will the system be set up in order to support both communication and learning?
- Content: Symbols, words, sounds and voice
- Access: Scanning options?

Initial Implementation Plan

Objective	Decisions/Training	Persons involved
Use of single word for communication	Switch training: Choose software	Student Classroom teacher Special education teacher
Two-word sentences (+adding up)	Other objectives for literacy development	Student Classroom teacher Special education teacher
Content development in cells 1. Illustrations + sentences 2. Illustration + words 3. Visual recognition of words	Grid size: up to 4X5 Number of initial pages: 5 Scanning: Visual scanning (border – enlarge), timings take into account difficulty in release	Assistive technology specialist Student Classroom teacher Special education teacher
Output: images, text and voice	Speech output: recordings	Whose voice?

[More concerns raised... to be continued](#)

Case 3: Chrysie

Chrysie is a primary education student. Her visual limitations prevent her from using a standard computer display. The school and family have consulted an AT service provider/team to help Chrysie find a way to use the computer. One of the issues that needs to be address is that she must use different computers during the day as she attends the mainstream classroom where there is a single computer for the class, but she is also supported individually by a special education teacher. The school has a computer lab that is also used in some for some of the courses during the week. In the afternoon she attends additional activities for learning a second language, and she also needs to use the computer to study at home. The service provider would like the opinion of the teacher in order to identify the best possible solutions for Chrysie. Your opinion matters! Chrysie needs to have continuity through her learning experience and you as a teacher and the school team need to be able to support her at all phases. What challenges need to be met? What approach would the team recommend? Personal laptop with personal AT? Use embedded accessibility of available computes/devices? How would the success of any approach be measured?

Questions to help consideration

- How often is Chrysie changing computers/devices?
- Is the school/classroom material available in digital format?
- Is a larger screen necessary? What percentage of magnification is needed?
- What other vision related adaptations are necessary?
- Is text to speech needed? If yes will it be used in classroom? What other adaptations are necessary (e.g. use of headset)

Assistive Technologies for communication in learning and education

Box 6. Communication

Communication is not only about talking. Communication is a multimodal system, in which people exchange messages of a variety of content and with a variety of means. Communication can be verbal with the use of oral expression and words, and non-verbal with the use of gestures, bodies or other means. The concept of communication in the digital era becomes even broader, where communication happens in social media, teleconference, messaging and more. A number of students may face challenges in verbal communication linked to barriers such as motor, sensory, cognitive, behavioral, social or social. The set of techniques, strategies and technologies that facilitate communication is known as Augmentative and Alternative Communication (AAC). It offers alternative ways when there is no or limited verbal communication and/or augments/increases and support communication possibilities. The goal is to expand the person's communication skills through all available modes and channels. These techniques and strategies maybe aided, i.e., employ the use of some kind of equipment and means, or unaided, i.e. do not use any additional means, and they often include gestures, facial expressions, sign language. Literature also refers to other categorisations and taxonomies of AAC.

6.1. Sign-Language

Some issues for consideration

Sign language is often defined as a manual communication where visual modality through structured gestures is used to convey a meaning instead of spoken words. It is not universal, and many countries have their own sign language. Even countries with same standard language and different dialects have different sign languages. In terms of technology current research is developing sign language recognition and interpretation Artificial Intelligence systems, which are not yet widely used and are not available for many. Not all students with hearing loss use sign language. Other types of technologies for hearing include hearing aids and cochlear implants.

- standardized national/local sign language
- interpreters
- use of SL video materials
- receptive and expressive SL skills
- lipreading and position of teacher in the classroom.
- it is commonly used by students who have a hearing loss,
- it is also adopted to support communication for other students that do not use spoken language
- are software solutions available?
- for students using hearing aids close collaboration with audiology and hearing professionals is needed
- adaptations for noise elimination

Examples and tools:

- [UNICEF ESARO guidance on Sign Language](#) (for Eastern and Southern Africa) but some tips maybe useful for all countries
- [See examples of Sign Language Story telling in ASL](#)

<p>6.2. Low-tech and medium tech AAC</p>	<p>Some issues for consideration</p>
<p>A number of strategies have been developed for AAC low-tech means. These include both the strategies and the tools, such as the PECS. Other low-tech means follow general principles of AAC development, and they include communication books, communication passports and frames. Mid-tech AAC is often battery/power operated and includes communication switches and devices with options of recording voice</p>	<ul style="list-style-type: none"> ▪ back up for high-tech ▪ a structured AAC approach may be implemented or may not, as long as the basis of AAC are followed ▪ student’s preference on visuals: illustrations, symbols, realistic pictures ▪ levels and number of messages ▪ recorded voice output: choose voice wisely with the student ▪ organization of tables/overlays ▪ portability
<p>Examples and tools:</p> <ul style="list-style-type: none"> • Support and ideas from PrAACtical AAC • ISAAC: International Society of Augmentative and Alternative Communication 	
<p>6.3. Hi-tech AAC</p>	<p>Some issues for consideration</p>
<p>Digital technology provides the opportunity for more complex and dynamic AAC devices and software. They are composed by a device, often portable, and a software for building the AAC system. They provide the option of limitless content, the use of a synthesized voice and flexibility for easier changes and adaptations.</p>	<ul style="list-style-type: none"> ▪ student’s preference on visuals: illustrations, symbols, realistic pictures ▪ organization of interface/overlays ▪ student’s preference on text: letters, phrases, words, prediction ▪ input: examination of control devices ▪ output: visual and synthesized voice ▪ portability and battery duration ▪ outdoors use issues: humidity, light
<p>Examples and tools:</p> <ul style="list-style-type: none"> • Support and ideas from PrAACtical AAC • ISAAC: International Society of Augmentative and Alternative Communication • Video: What is AAC: Alternative and Augmentative Communication • Try some apps: CBoard, Symbotalkapp 	
<p>6.4. Remote communication</p>	<p>Some issues for consideration</p>
<p>Teaching and interacting with students remotely entail another mode of communication. To make teleconferencing and messaging communication effective for all students accessibility accommodations need to be considered. These include video, audio, captioning, private and public text/chat. Messaging apps such as Whatsapp and Viber, as well as Messenger can also be used. Students can choose to hear or read a message, send a voice, a video or a text message or use other accessibility features such as voice recognition and enlargements.</p>	<ul style="list-style-type: none"> ▪ recording of video conferencing, check tool provider for guidelines ▪ live captioning: automatic or manual ▪ accessibility of the communication platform used ▪ sign language interpretation ▪ share content in advance ▪ individual support through chat or parallel channel of communication ▪ safety and security in using chat and messages
<p>Examples and tools:</p> <ul style="list-style-type: none"> • UNICEF Accessible Digital Learning Portal: Teacher’s guide: How to make remote learning accessible • Zoom Accessibility. • Teams accessibility can be found at Microsoft support • Google Meets accessibility 	



Check this out - Brainstorm – Develop ideas

Case 2 (continued): The story of Greg – the next Phase

During the initial implementation and follow-up, a number of issues were identified, especially with Greg moving in secondary education. Transition procedures were a challenge. On-going observation of the teachers and the team results showed:

Achievements	Considerations
<ul style="list-style-type: none"> Increased word recognition Increased communication needs/wants Technology familiarization Transfer in other settings 	<ul style="list-style-type: none"> Switch use: slow and frustrating Illustrations: limited vocabulary Recordings: in-flexible and lack of independence Communication opportunities limited

Repeating the SETT framework approaches new data indicated (Phase 2)

Areas of Consideration	
Mobility & Physical	<p>Switch: not effective re: users' pace for communication</p> <p>Access/Selection: Eye Gaze</p>
Learning & Cognition	<p>Literacy: visual recognition of a number of words, development of some phonological awareness</p> <p>Symbolic understanding: Excellent</p> <p>Comprehension: Excellent response, ability to select</p> <p>Memory: Excellent</p> <p>AT and Digital literacy: developing</p>
Communication:	<p>Eye movement and head movement for YES/NO very accurate</p> <p>Already creating short sentences with existing system</p>
Services & opportunities:	<p>Resources: Increased budget and trained staff in school</p> <p>Language: Advancements in AAC technologies in national context</p>

The decision: Tools (Phase 2)

Assistive technology to support communication and learning based on data:

- Eye-gaze AAC device
- Voice output with local language synthesized voice

Implementation Plan:

- Facilitate transition: knowledge building in the new setting, new support team, different procedures from primary to lower secondary and then higher secondary education
- Learner training for eye-gaze (new technology)
- Teachers', assistant's and family training built on previous experience (new teachers and school staff)
- Definition of individual sessions and classroom integration plan
- Digital Literacy developing together with reading and writing competences



Eye-gaze AAC device and software

Issues for consideration based on the HAAT framework:

Control interface: Eye-gaze

Selection set: symbols and on-screen keyboard with prediction

Output: Male synthesized voice

Mounting: Wheelchair mounting

Assistive Technologies for Processing Learning

Box 7. Learning and Cognition

There are a number of assistive technologies as well as accessibility accommodations that can support students in the learning process, throughout the various aspects of the curriculum and competences. If and when needed these technologies can be used in addition to access, control and communication technologies described in Boxes 5 and 6. Often categorizing technologies for learning, in addition to the above, includes identification of devices and applications for reading, writing, mathematics and STEM, memory and organization, and study skills. These are also relevant for face-to-face learning environments as well as digital, blended or online learning.

7.1. Assistive technology for Reading

Some issues for consideration

Assistive and mainstream technology to support reading may include support for decoding and reading comprehension. Such examples are the use of word processors for simplifying, highlighting, formatting texts; text recordings, text readers, optical characters reading, and audio books. Also symbols and image supported texts, including easy-reading adaptations, and other visualisations, and multimedia and video books, facilitate the multiple way of representation and adaptability of reading tasks. Virtual and Augmented Reality technologies are also gaining ground for promoting reading and literacy for diverse learners.

- no-tech and low-tech solutions can easily be implemented and adapted
- mid-tech and high-tech solutions provide flexibility
- recordings are good for students to also rehearse reading
- use of headsets for individual students
- symbols and pictures can support the whole text or only difficult words
- check education authorities for availability of textbooks in digital/editable format
- in case of VR check equipment and platforms available in your context
- in case of AR check for AR books available in your language

Examples and tools:

- UNICEF Accessible Digital Learning Portal: [Accessible digital textbooks initiative](#)
- DAISY readers / DAISY books: [Digital Accessible Information SYstem](#)
- Check out libraries in your area for digital and audio books relevant to curriculum, see for example [Bookshare](#)
- Check also [LivingBook Project](#) and [ReadTwinning](#) for good practices in promoting love for reading for diverse students
- Easy reading: [Easy reading project](#), Inclusion Europe [Easy-to-Read guidelines](#)

<p>7.2. Assistive technology for Writing</p>	<p>Some issues for consideration</p>
<p>Support writing with AT takes into account both writing motor skills and the cognitive aspect. For the motor aspect of writing access technology (Box 5) such as keyboards and other input devices can be considered. Low-tech writing aids also include grips, bookstands, stencils, writing cards, etc. For the cognitive aspect of writing spell checkers, text prediction, and proofreading are the most common tools. Other tools include speech recognition (dictation) and speech synthesizers and symbols word processors.</p>	<ul style="list-style-type: none"> ▪ adapt position and writing space vocabulary and thesaurus tools as part of proofreading can be very useful ▪ symbols can be used for writing not only for reading ▪ use of templates can facilitate organization of writing ▪ provide motivation through alternative writing (e.g. email) ▪ collaborative writing with online documents, wikis and blogs ▪ use of headsets for individual students including microphone
<p>Examples and tools:</p> <ul style="list-style-type: none"> • UNICEF Accessible Digital Learning Portal: Assistive technology guide: Low cost software for learning • Dictate in Microsoft office with speech recognition: Microsoft Dictate 	
<p>7.3. Assistive technology Maths and STEM⁵</p>	<p>Some issues for consideration</p>
<p>AT and accessibility for mathematics and STEM education in general. All accessibility adaptations mentioned in other sections are relevant here as well. In addition, tools may include digital mathematical, data recording and analysis worksheets that help student organize and process mathematical expressions, descriptions of STEM content, tactile and visual representations, digital representations, modeling software and simulations. Tables and differentiation strategies can also be AT. In addition, hardware may include calculators with larger and simpler interfaces and talking calculators.</p>	<ul style="list-style-type: none"> ▪ check accessibility of apps ▪ use apps and tools collaboratively between students ▪ think of possibilities of mainstream technologies (e.g. spreadsheets) that can be used to support the learning process ▪ use tools to remove barriers and help children focus on the essential learning objective (e.g. calculator for calculations if focus on logical thinking) ▪ use visual or auditory or alternative cues to facilitate systematic work (e.g. steps of experiments in science education)
<p>Examples and tools:</p> <ul style="list-style-type: none"> • UNICEF Accessible Digital Learning Portal: Assistive technology guide: Low cost software for learning • Effective Practices for Description of Science Content within Digital Talking Books • Math Learning Apps 	

⁵ STEM: Science, Technology, Education and Mathematics

7.4. Assistive technology for organization, memory and study skills	Some issues for consideration
<p>AT applications and software can be used for supporting students organizational and study skills, as well as memory. Some examples of such applications include reminders, that can be visual charts as well as alarms on digital calendars. Additional tools are prompt applications and note taking tools and strategies (including audio notes and recordings). Other tools include mind-mapping applications for organizing concepts and ideas. Some of them also allow multimedia and include accessibility features. Visual schedules and planners are also tools for organizing tasks, time and study processes.</p>	<ul style="list-style-type: none"> ▪ take digital competences of students into account ▪ use students own devices if available ▪ design/choose visuals together with students ▪ align with student's routine ▪ organisation and memory tools can be very useful for self-care and self-regulation tasks ▪ organization and memory tools may offer safety feelings to students with anxieties ▪ keep it simple and straight forward
<p>Examples and tools:</p> <ul style="list-style-type: none"> • UNICEF Accessible Digital Learning Portal: Assistive technology guide: Low cost software for learning • Check Google Keep for notes and tasks lists 	



Develop ideas

Case 5.1. Keeping focus and pace in reading

Eve is attending the third grade of primary school. She has developed reading skills to an extent decoding with some difficulties in keeping the line as well as focusing on more complex words. Teacher has initially used highlighters for colour-coding printed text which worked for Eve! Moving further into the school year Eve got her personal laptop in classroom with text-to-speech software. Highlighting spoken text continued to be very useful.

Additional issue for consideration:

- Colour-coding of lines are still important

Κάποτε ήταν ένα τζίτζικι και ένα μυρμήγκι. Το τζίτζικι είχε φτιάξει την φωλιά του στα κλαδιά ενός δέντρου ενώ το μυρμήγκι στις ρίζες του.

Ήταν καλοκαίρι και μόλις ανέτειλε ο ήλιος, το μυρμήγκι ξεκινούσε την εργασία του. Έβγαине από την φωλιά του και έψαχνε να βρει διάφορους σπόρους. Όταν έβρισκε

Ηθικά ζητήματα

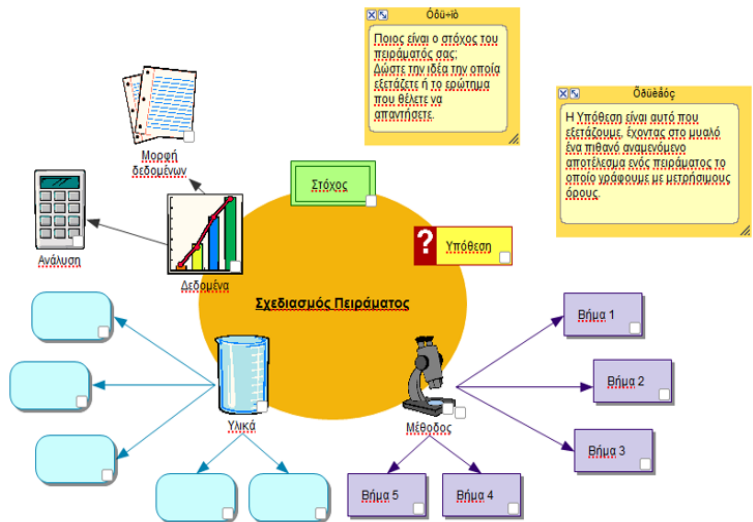
Το ημερολόγιο αυτό θα χρησιμοποιηθεί για σκοπούς συλλογής δεδομένων και ανατροφοδότησης στην εφαρμογή του προγράμματος εκπαίδευσης σε χώρους πολιτιστικής κληρονομιάς καθώς και για τα εργαστήρια συνεργατικού σχεδιασμού. Για σκοπούς προστασίας προσωπικών δεδομένων το ημερολόγιο θα είναι εμπιστευτικό και δεν θα δημοσιευθεί αυτούσιο σε καμία περίπτωση. Υπάρχει περίπτωση να χρησιμοποιήσουμε κάποιο υλικό από το ημερολόγιο στις ερευνητικές μας παρουσιάσεις, εκθέσεις ή δημοσιεύσεις, αλλά το όνομά σας δεν θα χρησιμοποιηθεί. Σας παρακαλούμε επίσης μην αναφέρετε ονόματα άλλων ατόμων και μην αποτυπώσετε φωτογραφίες με πρόσωπα και αναγνωρίσιμα στοιχεία ατόμων. Όπου είναι αναγκαίο θα χρησιμοποιηθούν ψευδώνυμα.

Case 5.2. Mapping science experiments

For Leroy courses with processes and lots of things to remember are really challenging. He is very stressed when it comes to Sciences course of the 6th Grade where they do a lot of experiments in the Lab. He can never be a team leader as he every-time feels that he fails to follow the steps and lead the procedure! The mind-mapping software the used for analysing concepts in language courses proved very useful for Leroy and the rest of the class!

Additional issues for consideration:

- Multimedia representations can be of added value
- Make map more interactive to provide options for action to Leroy and his classmates



Case 5.3. Collaborative writing

Mary attends the fourth grade of primary school. They gradually started working on short collaborative writing projects. Due to cerebral palsy Mary uses a personal computer with keyboard for writing. Collaborative tasks are a challenge! Using the same or different computers the teacher provided the opportunity to Mary to work with peers on shared documents in which they can all contribute synchronously and asynchronously.

Additional issues for consideration:

- Students' digital competences
- Check accessibility of online documents



Becoming more specific to digital learning environments

Box 8. Other technologies for digital learning environments

Digital learning environment need to be inclusive and accessible to ensure [inclusive digital education](#). AT tools mentioned in boxes 5, 6 and 7 can be useful and essential for access, communication and learning in any modality of technology enhanced learning experiences. In addition, it is highlighted that even when AT is available if learning environments are not inclusive and accessible the use of AT is not effective. For example, if a child has it’s individual screen reader, if websites and digital content is not properly designed and does not allow the use of a screen reader, the AT won’t work as expected. Thus, in addition to the technologies mentioned in previous boxes, some other applications and technology elements are presented here.

8.1. Learning content management platforms (LMS)	Some issues for consideration
<p>Digital and online learning is often supported by the use of a content management system. This is a platform that enables the organization of the learning content (e.g., a repository of learning material and readings), the interaction between learners and the learning content (i.e., interactive online activities) and the interaction and communication between learners, and instructor with learners. The most popular platforms used in children’s education are Moodle, Teams and Google Classroom. Of course, educational institutions may choose (or even build) other platforms</p>	<ul style="list-style-type: none"> ▪ accessibility of the LMS – check particular platform ▪ have a map/organizer (see mapping software in box 7.4) to help students find their way around the LMS ▪ visualize the map is possible ▪ ensure content accessibility (e.g. documents, videos, presentations and other content and material uploaded on the LMS (see 8.4) ▪ make sure students familiarize and develop the competences prior to the use of the tools ▪ ensure access to individual AT or embedded accessibility requirements and interoperability with the LMS.
<p>Examples and tools:</p> <ul style="list-style-type: none"> • Accessibility of various LMS: Moodle, Teams, Google Suite, Blackboard Learn • UNICEF Accessible Digital Learning Portal: Ecosystem of accessible digital content and tools • UNICEF Accessible Digital Learning Portal: Types of accessible digital learning solutions 	
8.2. Teleconferencing tools	Some issues for consideration
<p>Remote communication during education and learning involves a variety of tools. In addition to points in Box 6.4 some more issues to consider during remote and online synchronous learning refer to time management, sound, sharing screen, chat options. In addition, symbols and prompts for students using AAC, students with cognitive disabilities, students from diverse language and culture backgrounds, students that are more visual can be very effective during teleconferencing. Some of these are especially important in hybrid formats where some students are present and some online. Multiple channels for providing the information and clear processes are essential</p>	<p>(Additional to Box 6.4)</p> <ul style="list-style-type: none"> ▪ sound: eliminate environmental noise and use headset if possible ▪ mute students unless they want to speak ▪ share screen and describe everything on display ▪ provide material in advance to provide opportunities to student seek further accessibility as well as get prepared (see accessibility 8.4) ▪ use chat often for main points and reminders ▪ provide content through other channels too (e.g., links to videos through email and LMS) ▪ record meeting (if allowed/consent.

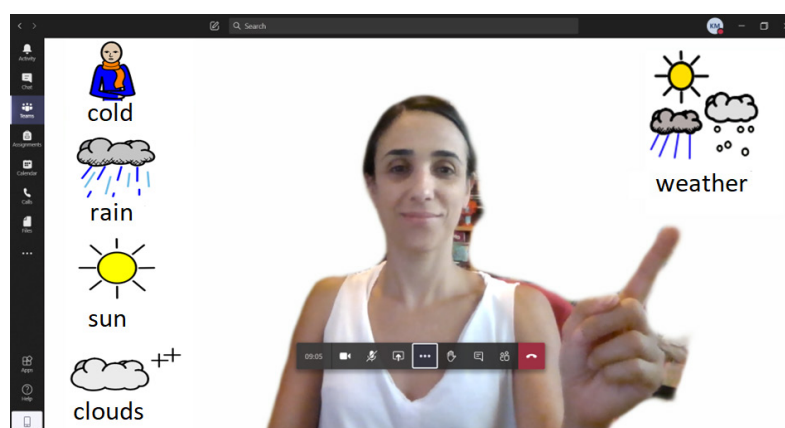
<p>Examples and tools:</p> <ul style="list-style-type: none"> UNICEF Accessible Digital Learning Portal: Teacher’s guide: How to make remote learning accessible UNICEF Accessible Digital Learning Portal: Types of accessible digital learning solutions Zoom Accessibility. Teams accessibility can be found at Microsoft support Google Meets accessibility 	
<p>8.3. Collaboration, interaction and use of assistive technology</p>	<p>Some issues for consideration</p>
<p>One of the main essential elements of digital learning in any modality is interaction and interactivity. Students should be able to be engaged in activities and interact with the content, while they will also need to have the opportunity to interact between them and collaborate. There are a number of tools that can facilitate this such as, digital interactive material (e.g., flashcards, hyperlinks, interactive videos, simulations etc). In addition, collaborative documents, blogs and wikis are also tools that promote remote and online collaboration and opportunities for participation. Collaboration also entails collaboration with the community, families and continuity in children’s environment outside classroom.</p>	<ul style="list-style-type: none"> cloud technologies and documents (e.g. Google Drive) are easy to use as collaborative documents check accessibility of shared documents ensure access to individual AT and embedded accessibility – contact community provide tutorials and guidelines if students are not fully familiar provide extra exercises for familiarization and practice with tools assign/co-decide roles for remote collaborative activities align tasks and roles with accessibility, access requirements and experiences of individual students create a parents blog / communication channel
<p>Examples and tools:</p> <ul style="list-style-type: none"> Ideas of collaborative activities and use of AT in remote interaction: AT&ME UNICEF Practical Guide to blended/remote learning and children with disabilities 	
<p>8.4. Digital learning content and materials</p>	<p>Some issues for consideration</p>
<p>Inclusive digital education also requires accessible learning content and materials. These should be used together with assistive technologies and accessible learning platforms. Accessibility of learning content and material involves accessible documents (e.g. docs, pdfs, presentations, videos), accessible content (i.e. easy to read, simple, well organized), universally designed learning material (i.e. multiple options of representation, multiple options for action and expression and multiple options for engagement).</p>	<p>principles and guidelines of UDL (more in Section 3)</p> <p>mind accessibility at all levels: access, content and comprehension, action, multimedia and multimodality are not always accessible</p> <p>templates sometimes help</p> <p>list tasks and points</p> <p>backup in printed/hard copies</p> <p>visualize – use symbols</p> <p>simplify guidelines and dense text</p> <p>use accessibility checkers</p>
<p>Examples and tools:</p> <ul style="list-style-type: none"> UNICEF Accessible Digital Learning Portal: Accessibility toolkit for digital learning materials UNICEF Accessible Digital Learning Portal: Teacher’s guide: How to make learning materials accessible Accessibility Cheat sheets from the National Center on Disability and Access to Education (US) 	



Develop ideas

Case 6: Visual cues during teleconferencing

During the lockdowns of the COVID-19 pandemic period Ms Kate's primary school transferred online. Children met on Teams with their teacher every day for 80 minutes, with a short break in between. It was really a challenge to keep the attention of everyone! The classroom was diverse in terms of learning profiles, digital competences, cultural background. Two of the students were also identified as students with disabilities. Mike, a child with intellectual disability preferred symbols and pictures in reading and Elen was using a low-tech communication device with symbols. For Ms Kate using visual and conceptual supports during meetings was important to keep students' attention and interest and increase understanding and engagement. She tried to align relevant techniques with the individual assistive technologies used by Mike and Elen. For example, she familiarized all students with the symbol set used by Mike and Elen and she integrated them in her general teaching strategies, i.e. when discussing weather forecast vocabulary during her online class.



Additional issues for consideration

- competences of all students in symbol reading and use
- consistency in the use of symbols as visual cues for all learners in other activities and material
- use similar strategies albeit learning and teaching modality



Read – Search – Consult

Catalogues and Databases with AT Resources

The [UNICEF Accessible Digital Learning Portal](#), is also used in the examples and tools outlined above. It is a hub for technology focused information, content, tools, products and resources that support disability-inclusive education in remote and classroom settings. It provides resources for the production, distribution and implementation of accessible digital content and tools in high and low-resource environments and refers to all stakeholders including educators, learners, parents, policy makers and producers/publishers of educational content.

The Global Assistive Technology Information Network (EASTIN) is a global network initially started as an EU funded project, hosts an easy-to-use tool that opens the door to several national databases at the same time, so you can look up the information you require and have it immediately translated into your own language, where necessary. AT products are organized under various categories, searchable with a number of keywords/criteria, one of which is the ISO standards for AT, through the EASTIN search engine. Watch here an introductory video to [EASTIN Video 5: EASTIN: The Global Assistive Technology Information Network](#)

Software and applications catalogues are also available through various initiatives. Some can be found at:

- UNICEF [Catalog of Accessible Content, Platforms & Tools](#)
- AAATE Blog contributions and resources: [Accessible and assistive technology resources and supports for Ukraine and for Ukrainian refugees](#) (by Siobhán Long), [COVID-19 and education: Use technology for a more inclusive approach](#) (by Katerina Mavrou)



Additional Resources and Tips

In principle, once inclusive in physical educational spaces you can also be inclusive in digital learning environments. Inclusive education is not only a set of pedagogies and approaches, is a state of mind, is a matter of attitude! And this is not different for any learning delivery modes, and for any different modalities of learning experiences. AT has an added value for education, and this is what needs to be highlighted when designing, developing and implementing learning experiences for all learners.



Think – Reflect – Act

1. Definition, provision, support and use of AT in education is heavily influenced by the pedagogical, policy, social, institutional context. **Go back to activity on national policies and your school self-evaluation. Think of your own region, educational authorities, school, classroom and reflect:**
 - Would the term educational technology or technology for education convince your policy makers to fund a trackball for a child with cerebral palsy?
 - In your context, can Educational Technology be AT and vice versa?
 - Is high-tech considered more important than low-tech for the parents you are working with? Or is high-tech considered not appropriate for children with severe intellectual disabilities?
 - An AAC Device is a tool for communication.
2. There are abundant AT resources at a regional and international level, which bloomed especially during the last decade. Sharing resources is essential. **Make a list of national and regional AT resources and tools and how they can be accessed. You may use the categorization of the Boxes in this Section, or any other organization strategy seems useful for you. main National initiatives in your country in relation to the promotion of AT.**

Make this a share document and collect resources collaboratively!



Section 3: Learning Design, Differentiation and UDL

Designing inclusive learning processes and activities with the use of technology



Overview

This Section focuses on the design of learning processes and activities which are employing the principles of inclusive pedagogies while taking into consideration AT. To be successful for inclusive education, AT should be used in accessible learning environments and constitute an integral part of the learning process. Thus, the two paradigms shifts are brought together, in an effort to identify how AT is integrated in designing learning experiences and activities for all. Then ideas of employing AT in the implementation of differentiation strategies are exploited, while the learning situation follows the principles of UDL.



Can do: Competences relevant to this section

Main assumption: Teachers and school teams need to identify the added value of assistive and accessible technology in removing barriers and increasing participation in education.

- To plan lessons and learning activities having all learners in mind.
- To design evaluation activities contributing to the achievements of all learners.
- To design learning activities that promote learners' education, collaboration and participation.
- To consider principles of UDL in terms of engagement, representation and action & expression in all aspects of the learning process.
- To transfer the AT relevant objectives of the learners' individualized educational programs into inclusive lesson planning.
- To apply basic accessibility solutions and AT in learning activities for learners with disabilities.
- To integrate ICT and AT, including personal AT of learners, as an integral and embedded part of learning activities.
- To differentiate materials, learning objectives, teaching methodologies and assessment approaches with the use of AT and accessibility requirements for each learner.
- To integrate alternative options for learning, language and communication, and physical access and motor needs of all learners through AT.

- To provide alternative methods of assessment of cognitive learning, language and communication, motor and sensory learning, development and performance of all learners with the use of AT.
- To encourage communication with various and alternative means amongst all learners.
- To provide opportunities of familiarizing with ICT and AT for all learners.
- To promote all learners' interaction and collaboration through the use of AT.
- To organise the learning environment (activities, resources, opportunities for participation, collaboration, etc.) to promote interaction and respect learners' individual needs and characteristics.
- To design curriculum and lessons that promote awareness and acceptance of AT and diversity to all learners.



Know – Understand – Analyse

Key points to remember

- Technologies and assistive technologies are integrated in learning, in a way that they have an added value for modifying and redefining educational tasks to promote interaction and maintain participation and engagement of all learners.
- Developing a lesson plan for any mode and modality of learning to promote inclusive education through the use of AT, entails the employment of UDL guidelines and its alignment with appropriate methodologies and assistive technologies. Within this process the individual educational planning for some learners is essential for the AT competence development and is neither detached nor independent from the classroom program and curricula.
- Learning activities are inclusively interactive if facilitated by differentiation strategies where technology is used as a tool for providing equal opportunities for participation and engagement.

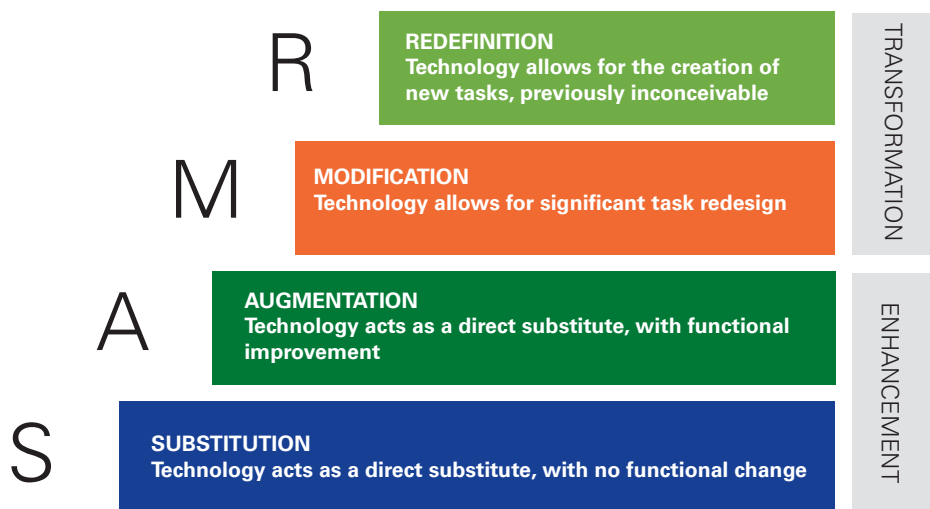
3.1 Learning for all in the digital era with the integration of technology: Bringing together models from digital enhanced learning and AT



Key point: Technologies and assistive technologies are integrated in learning, in a way that they have an added value for modifying and redefining educational tasks to promote interaction and maintain participation and engagement of all learners.

Educators and researchers have been continuously looking on the benefits of the use of technology for learning progress and achievement. A number of frameworks have been developed to represent as well as facilitate understanding of the ways technology impacts education and learning. One of such frameworks is the SAMR model introduced by Puentedura (2010). This a conceptual framework that can help educators to analyse the effectiveness of technology on students' learning through various categories/layers of how technology maybe integrated in and changes various aspects of the learning process. Figure 6 presents the four layers of the SAMR Model.

Figure 6: The SAMR framework



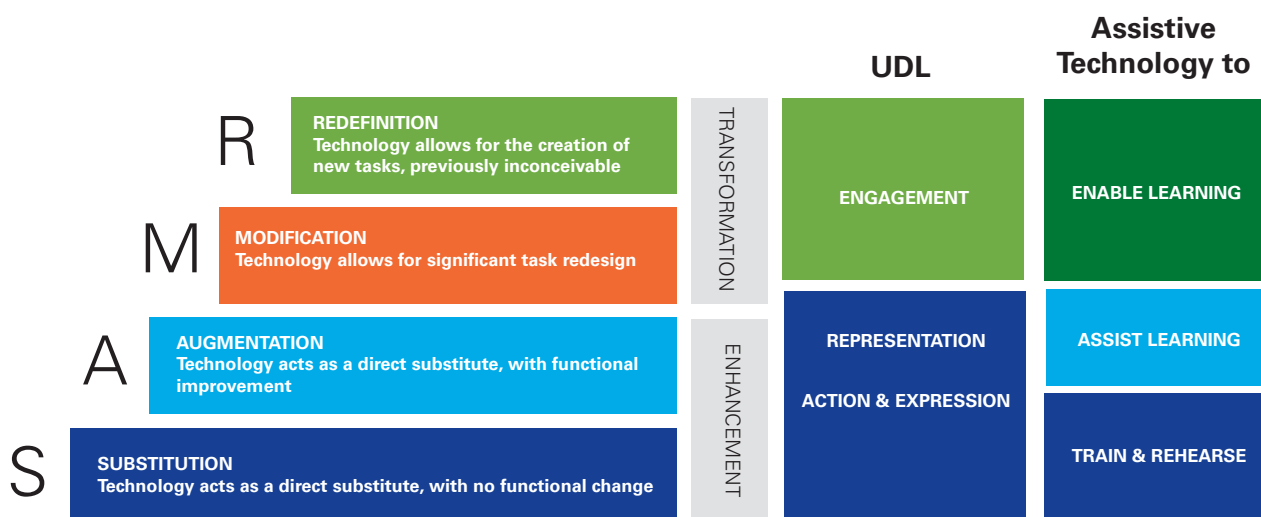
Starting from the bottom, **Substitution** refers to the use of technology in education to direct substitute traditional methods, with no further functional change. If we use the task of writing and text processing, an example of this would be the use of a computer to type/insert text, instead of writing in paper and pen. **Augmentation** is when technology is substituting the traditional methods, but it does have an additional functionality. In this case a text editor such as Microsoft Word, would additionally give the opportunity to format text. Thus, in these two levels, there is some added value of technology for the **enhancement** of the learning process through tools that are more contemporary and provide an improved (re)presentation of the information/text. Moving to **Modification**, technology integration involves significant task redesign, in which technology has an increased functional role in making learning and competences development in ways that wouldn't be possible through traditional methods. In the case of text editing, an online share document can be used (e.g. Microsoft SharePoint or Google Docs), that would give the opportunity to multiple students to collaborate and edit the same text synchronously or asynchronously, and provide feedback and complimentary work to one another. In **Redefinition**, the learning process is completely transformed with the use of technology. In this case there are opportunities to create more tasks in ways that we wouldn't imagine before. Text editing would become an audiobook, or an interactive video combining text, image, sound, motion, options of interactivity and control of the users and editors of the 'text'.

The SAMR model is relevant to the use of AT in education, especially if we make the connections to taxonomies of AT (see [Section 2.3](#)) and the principles of the [UDL](#) (Mavrou et al, 2019). One AT that seems relevant is that introduced by Abbott (2007). When looking into the use of AT for digital inclusion, three categories maybe identified. First, technology use to **train or rehearse**. This is more the use of AT to train specific skills, through repetition and substitution of traditional means. In the case of text editing, this would be the use of a keyboard by a student for whom paper and pencil is a challenge, in order to get trained in typing. Second, technology use to **assist learning**. In this case, the use of the keyboard goes beyond training for typing, to, for example, compensating physical disability and having keyboards and word processing as the means to access writing tasks in classroom, rather than for example an assistant taking notes. The third category is the use of technology to **enable learning**. Here technology makes learning possible in ways it wouldn't be with the use of traditional means. Thus, AT becomes a tool for interaction and participation for all learners. Dictate and speech to text software, or eye-gaze possibilities would provide further freedom of control and opportunities for participation for a student with disabilities.

In addition, audio books and interactive videos would possibly remove the barriers still remaining in the previous two categories and give space for motivation and engagement in additional tasks.

Finally, moving into UDL and the implementation of its principles and guidelines, we can realise that in order to achieve **Redefinition** and **Enablement** learning with the use of AT, all principles should be implemented. If we implement solely the principle of **Representation**, we may keep students to the level of Substitution and Augmentation, where we could focus on training and technology assisted learning. Providing alternative options for **Action and Expression**, focusing solely on access and accessibility, learning may again remain at a level of *Augmentation* and minimum support. If further opportunities for participation are provided through different motivations for **Engagement**, the learning process is enabled in ways that learning tasks and **Experiences are Modified and Redefined**. Figure 7 presents a methodological framework (Mavrou et al, 2019) that introduced for designing learning experiences, based on this relationship between SAMR, UDL and Abbott’s (2007) taxonomy.

Figure 7: Methodological framework for designing learning by combining SAMR, UDL & AT taxonomy



Read – Search – Consult

Wish to know more about the SAMR framework?

Check [Ruben R. Puentedura’s Blog](#). Dr Ruben Puentedura has founded Hippasus, a consulting firm in the United States, focusing on transformative applications of information technologies to education. The introduction of the SAMR framework helps the design, development, and integration of learning technology tools in support of student learning, in four levels that are easy to understand and to connect to the added value of AT.



Think – Reflect – Act

1. Has your school reflected on how you can improve the way technology is used for teaching and learning?

Use the [SELFIE Tool of the European Education Area](#) to find out!

SELFIE is a free online reflection tool to support schools in using digital technologies for teaching and learning. SELFIE collects — anonymously and on a voluntary basis — the views of students, teachers and school leaders and summarizes the results in an interactive progress check, which presents a picture of each school's strengths and weaknesses. The SELFIE survey can be conducted up to three times during an academic year to enable each school to track its progress over time. SELFIE holds different questionnaires for school leaders, teachers and students. Each school and group can choose the questions that are more relevant to your setting and context.

Some further reflection: Check if and how SELFIE addresses issues of inclusive education, accessibility and disability. Does it? To what extent? What is probably missing?

3.2 Inclusive lesson planning with AT and accessibility



Key point: Developing a lesson plan for any mode and modality of learning to promote inclusive education through the use of AT, entails the employment of UDL guidelines and its alignment with appropriate methodologies and assistive technologies. The AT competence development is closely linked to the classroom program and curricula and therefore should be included in the process the individual educational planning.

Inclusive learning design with the use of technology is very much connected to the framework of UDL. In this sub-section, the aim is to provide some ideas on how teachers can organize their learning planning and activities development ([Section 3.3](#)) to foster education for all learners by employing technology and AT tools to respond to the UDL guidelines. The UDL framework [guidelines are enhanced with detailed checkpoints](#) that help teachers and school teams to select and implement tools and approaches including AT by providing examples and suggestions of tools, technologies, adaptations and approaches. The checkpoints can also serve as a self-evaluation rubric for teachers to evaluate their existing practices and re-design them, in order to make the learning environment universally designed for their students.

Learning design and lesson Planning

Every learning process regardless modality, mode of delivery, age group or educational setting, to be successful needs to be carefully planned and designed. When particular aspects of the learning process need to be considered more thoroughly, these should be accounted across all elements of the curriculum, the design of the learning environment and lesson planning. Therefore,

Regarding integrating technology into learning, based on the frameworks discussed in [Section 3.1](#), in order to bring digital transformation in the classroom practice it is necessary to implement strategies in which:

Design	is learner centered and learning community-based
Technology	holds an added value and great potential for redefining learning tasks
Participation	is promoted through activities for interaction and engagement

Similarly, in order to achieve inclusive education in classroom practice learning (re)design strategies concern:

Design	is based on the principles of UDL and inclusive pedagogies
Technology	holds an added value for promoting accessibility and digital inclusion
Participation	is promoted through differentiation and equal opportunities for interaction and engagement

Consequently, lesson planning and design can be inclusive with the use of AT when:

Design	is learner centered and follows the principles of UDL and inclusive pedagogies
Technology	holds an added value for promoting accessibility and digital inclusion in the redefinition of the learning tasks & experiences for all learners
Participation	is promoted through implementing differentiation strategies in learning activities, so as to provide equal opportunities for interaction and engagement

Throughout this process teachers are expected to employ a number of strategies at all phases: preparation, planning, and implementing in the learning process. These strategies are relevant to knowledge, principles and competences outlined in the previous sections of these UNICEF Guidelines as follows:

Step 1: Learning Design – Preparation concerns and strategies:

- At a preparation stage, teachers need to:
- Identify barriers in opportunities for participation in the classroom
- Identify barriers in access and technology in the classroom
- Assess existing needs, knowledge and competencies
- Identify resources, both human and artefacts/products/technologies

In summary, to do so, teachers need basic knowledge and understanding of how diversity is defined in relation to social and environmental factors, and how what we identify as difficulties can be eliminated if barriers are removed. Inclusive pedagogies involve approaches and strategies for removing these barriers (refer to [Section 1](#)). Additionally, it is important to be familiar with the most common assistive technologies and how they can match various students requirements in order to be beneficial in education and not only (refer to [Section 2](#)).

Step 2: Learning Design and AT - Lesson Planning concerns and strategies

Next, a lesson plan is developed taking into consideration information collected at the preparation stage. Planning involves a number of decisions:

Design Decisions

- Definition of the setting, mode and modality of learning (e.g. f2f, online, in class, elsewhere in school etc)
- Definition of the learning objectives including objectives for digital competencies, keeping in mind the needs of the learners and the modality of learning.
- Definition of the time-schedule of the lesson plan unit
- Decisions about the types of learning activities to be implemented in order to achieve the learning objectives

Technology Decisions

- Identification of the assistive technologies already used by particular students
- Identification of how and where in the time-schedule and activities development technology will be integrated
- Definition of the assessment methods both formative and summative and the role of AT in those
- Decisions about the tools and materials, including technologies that will be used

Inclusion Decisions

- Identification of persons involved, and consideration of any additional relevant training/ preparation needed (e.g. the learner, educators, assistant, carers)
- Alignment of the planning elements (objectives, activities, development of materials, evaluation) to the principles of UDL
- Definition of differentiation strategies across all lesson plan elements (objectives, activities, development of materials, evaluation)
- Definition of the added value of all technologies to be used including students’ individual AT

These decisions concern positioning of learning, shaping the lesson framework, setting timing of activities, developing final plan ready to go (Figure 8).

Figure 8: Visual representation of the process of lesson planning with AT

	Position	Shape	Set	Go
Design	Identify the setting, mode and modality of learning	Define learning objectives including objectives for digital competencies	Define time. schedule	Decide activities types
Technology	Identify existing AT	Define assessment methods & the role of AT	Identify how, where & when technology will be integrated	Decide tools and materials, including AT
Inclusion	Identify persons involved & consider preparation/training	Align planning to UDL principles	Define differentiation strategies	Define ALL technology’s added value

Each educational system, educational authority, school or teacher may hold their own templates and guidance for lesson planning. Though the format is not important what is important is to be able to identify how UDL principles, differentiation strategies and AT come together across all lesson plans elements. Table 3 presents an example of how this kind of thinking can be facilitated:

Table 3: Mapping thinking for planning with technology in line with UDL

Principles of UDL	Learning Design and Activities	Means, Tools, Technology
Provide options for Engagement	<ul style="list-style-type: none"> • Learning environment (or platform) • Meaningful activities • Relevant to digital and AT competencies • Compulsory and optional activities • Alternative assessment opportunities 	<ul style="list-style-type: none"> • Organization of the learning environment (or platform) • Accessible learning materials and alternatives • Connections with hyperlinks and bridges • Accessible interactive content
Provide options for Representation	<ul style="list-style-type: none"> • Physical accessibility for all • Alternative means of presenting information and content 	<ul style="list-style-type: none"> • Available AT • Subtitles, audio, multimedia • Digital editable and accessible content • Easy-to-read
Provide options for Action and Expression	<ul style="list-style-type: none"> • Synchronous and Asynchronous Learning (f2f or online) • Differentiation in opportunities for participation • Differentiation in assessment • Staged and leveled activities and assessment 	<ul style="list-style-type: none"> • Multiple means for communication and interaction (e.g. IM, email, chat, AAC) • Interactive content (e.g. video other material) – compatible with existing AT

Analysing lesson planning as presented in the example of Table 3, we need to think of the characteristics each learning activity should have in order to respond to each principle of UDL. Then we need to examine and integrate the available technology in ways that address the corresponding principles.

For example, to provide **options for engagement** we need to decide how to make activities meaningful and easy to complete, by employing existing digital competencies, or make sure that these competencies are developed in advance. Then, define how technology facilitates meaningful learning: are there any links, connections and accessible interactive content? Is an overview of what is expected by students provided in alternative formats that helps students align objectives and content to own experiences and preferences?

Similarly, for providing **options for representations**, the first thing we reflect upon is physical accessibility and various information in various modes that support students to perform in learning activities. Are reasonable accommodations such as assistive products for access, subtitles, audio, etc., available?

The same goes for options for **action and expression**. What means of communication in the broader sense are available? And how are students activated and motivate to use these means? For example, if AAC is used by some students how are dialectical processes planned to encourage the use of the AAC?

For a more comprehensive lesson plan, institutions, educational systems and authorities, schools and teachers may have their own lesson plan templates, to facilitate design of the daily learning process and environment. Sometimes it is helpful to materialize and even visualize the above considerations in such planning documents. There are a number of resources that help teachers to do so. A suggestion of a lesson plan template is provided in [ANNEX 3](#), which of course can be adopted, adapted, amended or just consulted in any way deems appropriate in particular contexts.

Finally, it is highlighted that the preparation and lesson planning phases are part of a broader Implementation Plan, discussed in [Section 4](#).

Step 3: Development and Implementation of Learning activities with the use of AT

Planning is followed by development and implementation. This is the stage where the lesson plan is materialized and implemented. However, the process is not linear, and needs to be collaborative and flexible. Thus, development and implementation consider the following:

- **Respond to previously identified barriers:** During development of activities and material it is necessary to go back and re-examine how these are anticipated to respond to barriers and increase opportunities for participation.
- **Meetings and communication:** teaching in any format and modality entails meetings and communication, either synchronous or asynchronous, face-to-face or remote. This communication needs to employ, as well as consider, AT functionalities and accessibility requirements.
- **Content and material:** AT functionalities and accessibility requirements are also used in developing learning content and materials.
- **Educators' decisions and choices:** both before and during implementation teacher's decisions and choices are expected to allow students have control on their learning preference and be consulted. This facilitates further alignment with the principles and guidelines of UDL and embracement of differentiation strategies.

Practical suggestions on development and implementation of learning activities with the use of AT are presented in [sub-section 3.3](#).



Read – Search – Consult

Find out more details about the UDL framework, Guidelines and Checkpoints

[UDL Principles and Guidelines](#)

UNICEF's [Teacher's guide: How to make learning materials accessible](#)

[UNICEF's Guides for accessible textbooks for all](#)

Individual Educational Programs (IEPs)

Often students with disabilities follow an Individual Educational Program (IEP) including individualized objectives, as an attempt to acknowledge individual needs, expectations, pace, learning profile. However, in many cases such programs correspond to individual support sessions and individual assessment, leading to segregated formats of education. There is great risk, and sometimes a fact in many educational systems, that AT is considered as a tool attached solely to the student's individual goals and individualized support sessions, while it remains detached from the inclusive classroom practice. Is there a balance?



Develop ideas

Back to Case 5.3: Mary uses a personal computer with keyboard for writing

At the second grade of the primary school Mary was provided a personal computer with key guarded keyboard and a trackball. She was able to use both hands for typing and prefers left hand for the trackball. Mary has a personal assistant in the classroom. School was puzzled trying to figure out: where would the technology be placed? Who was responsible for setting up the technology? When would this be used? Who was going to teach Mary to use the technology? Would all her learning material need to be in digital format? And who was going to prepare this?

Mary attended individual support sessions three times per week. The multi-disciplinary team responsible for her IEP decided that Mary's individual objectives should be revised and integrate the use of AT. However, there was some resistance from the special education support teacher, who declared that 'she is not an ICT teacher and development of digital skills is not in her role'.

Family and Mary herself were excited with the new technology. They were keen for Mary to have greater participation and independence in class with the use of the technology.

Check out school responses to the case of Mary in relation to individual learning objectives. General consideration: Which boxes correspond to AT for inclusion?

Box 9.1. IEP Area: AT competence development

Old objective: *AT was not included in the IEP*

New objective: To identify the position of all letters in the keyboard in copy typing from printed text

AT competences are the targeted

Box 9.2. IEP Area: Writing skills

Old objective: To compose simple three-word sentences in order to describe a picture

Revised objective: To compose simple three-word sentences using her keyboard in order to describe a picture

AT becomes the tool for developing other competences

Box 9.3. Transferring IEP and AT in the classroom

School decided that the best way to integrate Mary's AT in the classroom is to have her copy typing most of the time in order to practice in the use of her keyboard. Mary gets very bored. Other students are doing more exciting and interesting stuff while Mary works closely with the personal assistant typing sets of words and sentences... Parents asked for a follow-up meeting requesting for software that Mary could probably use in the classroom with her AT, so she won't get bored.

Questions for consideration:

- What is the barrier that stops Mary joining classroom activities?
- Would additional software be the solution?
- In which level of the SAMR framework and Abbott's taxonomy can the current technology integration for Mary be categorized?
- Which level does Mary and the family expects to reach?
- Check Box 9.4

Box 9.4. Let's go back to [sub-section 2.3](#), Box 7 – Mary at the fourth grade

Mary attends the fourth grade of primary school. They gradually started working on short collaborative writing projects.... Collaborative tasks are a challenge! Using the same or different computers the teacher provided the opportunity to Mary to work with peers on shared documents in which they can all contribute synchronously and asynchronously.

Questions for consideration:

- Was this approach not age appropriate two years ago?
- In which level of the SAMR framework and Abbott's taxonomy can the current technology integration for Mary be categorized?
- How is UDL reflected in this approach?
- Who else is benefited?

Box 10: Summary box - things to remember

Four phases for the selection, acquisition, implementation and integration of AT in the IEP and the classroom practice comes in four phases (Edyburn 2002)

- Choice:** Focuses on the organization, investigation assessment and identification of the appropriate AT
- Acquisition:** Locates the appropriate technology which is acquired for particular students, groups of students or classroom
- Implementation:** encouragement of teachers to think and organize the way to create educational opportunities for the successful use of AT
- Integration:** focuses on the use of AT in the learning environment. This fourth phase involves various factors for success:
 - **Connect technology** with the curriculum
 - **Manage** issues of access and use of technology by the student
 - **Assess** the effectiveness and usefulness of technology for increasing participation
 - **Examine** how the use of AT by the student can be expanded in other learning (and not only) environments



Read – Search – Consult

- Find out more about the work of projects focusing on lesson plan co-design in digital and blended learning environments.

Lesson plan co-design with students is gradually gaining more ground in the research and practice of inclusive education, especially in digital and blended learning environments. The [Blended Learning for Inclusion \(BLENDI\)](#) project developed a synergetic lesson planning methodology and platform and additional tools for supporting inclusive digital education through blended learning.



Think – Reflect – Act

1. Give it a try! Get one of your lessons plans and identify barriers and opportunities through all of its components, by highlighting tools and approaches you may have/use for addressing barriers. Which are the things that may hinder, and which may support the use of AT for inclusive education in your planning?
 - Mapping and juxtaposing barriers and opportunities in a table maybe helpful. A template is provided in [ANNEX 2](#). However, you may reflect on this in any way you prefer
2. Now, go through your lesson plan once again by looking at the UDL checkpoints! Note what you implement and how. Note what you can do better, and which technology could be useful. Remember, the [UDL checkpoints can be found on the CAST official website](#).



Additional Resources and Tips

- Additional tips for Managing AT in the classroom

Box 11: Managing AT in the classroom

- Assess, identify, acknowledge the need of the AT in the classroom
- Set up, transfer, configure AT in the classroom
- Define the child's position and the use of AT without isolating, stigmatizing, excluding from any other activity
- Involve all students – promote collaboration
- Include AT in the lesson plan and the classroom time-schedule
- Adapt material where necessary
- Employ differentiation strategies
- Set small and short-term objectives
- Align objectives to the curriculum and those of the e whole classroom
- Provide opportunities to use the AT
- Encourage and promote student's self-confidence
- Have technical support contact details in hand!

- Some specifics to remote learning design

In order to apply UDL in online learning, literature suggests some more specific steps, summarized in Table 4 (Dell, Dell & Blackwell, 2015; Rappolt-Schlichtmann, 2020)

Table 4: UDL in online and remote learning

UDL Principles	Steps
Engagement and Interaction	<ul style="list-style-type: none"> • Carefully select the platform tools • Create accessible documents • Prefer HTML instead of PPT (powerpoint presentations)
Engagement and Interaction Content Representation	<ul style="list-style-type: none"> • Provide alternative options for visual/auditory information
Content Representation	<ul style="list-style-type: none"> • Mind content first and then appearance • Simple and consistent navigation in the online space • Careful choice of colours and fonts
Action & Communication	<ul style="list-style-type: none"> • Develop clear guidelines for good communication and discussion (netiquette)
Additional Tips	
Be clear about objectives and expectations	<ul style="list-style-type: none"> • Provide specific information • Mind for less memory load • Focus on important elements • Use simple language
Opportunities for asynchronous learning	<ul style="list-style-type: none"> • Class recordings • Alternative options for accessing the class material
Note taking	<ul style="list-style-type: none"> • Prepare notes in advance • Students roles • Assistants roles
Material accessibility	<ul style="list-style-type: none"> • Follow accessibility guidelines and standards for material of different modalities
Learning communities	<ul style="list-style-type: none"> • Encourage small discussion and meeting groups • Opportunities for discussions beyond the lesson content

3.3 Developing learning activities and material that integrate AT and include all learners



Key point: Learning activities are inclusively interactive if facilitated by differentiation strategies where technology is used as a tool for providing equal opportunities for participation and engagement.

Following lesson planning and design, the implementation phase requires actual development of the learning activities, tools and materials to be used during the learning process. As mentioned in previous sections, all elements of lesson planning and curriculum components need to follow guidelines of UDL, differentiation and accessibility in order to promote inclusive learning

environments. In this sub-section practical examples of the use of AT in particular activities and material developed are presented. Examples are evidence from classroom practice and efforts of teachers to employ inclusive pedagogies and integrate AT and accessibility in particular learning activities to promote inclusive education. The technology is used in ways that support participation of individual students as well as in ways that engage and benefit all students in the classroom. In the following paragraphs, some strategies and steps in the actual development of the activities and materials are proposed:

Break down each lesson plan activity (see ANNEX 3)

The analysis of each activity that is included in a lesson plan can be useful for identifying how the teaching and methodological approach and the tools and materials used, respond to the guidelines of UDL in practice. A mapping or alignment exercise may facilitate teachers' thinking and reflection while developing the activity and the materials. [ANNEX 4](#) includes a suggested approach (introduced by the SKATE project) to this analysis and mapping of activities. This approach as well as others that can be implemented by teachers consider the following:

- Each activity has **learning outcomes** that are connected to the whole lesson plan learning objectives. These need to be formulated in ways that both the language used, and the expected outcome allow **flexibility, options and differentiation**
- Tools and materials exploit **AT, and they comply to accessibility and universal design guidelines.**
- Approaches **encourage all students participation** and give **opportunity** to all to use technology, including individual AT tools.

Use AT in differentiation strategies

There are a number of strategies for applying differentiated instruction, some of which are summarized in [Section 1.3: Differentiated Instruction](#). These strategies take into consideration learners' readiness, learning profile and interests and just like UDL, they refer to all elements of the learning process, i.e. content, process, outcome, assessment and learning environment. For example:

Strategies based on readiness would take into consideration the revised Bloom's Taxonomy (Anderson & Krathwohl, 2000). While applying differentiation, it is expected to define children's processing skills at each level, the activities and the approach to do this and the means, i.e. tools and technologies, that can be used. These strategies also serve all three principles of UDL as students readiness depends on how students perceive the information, how they act upon their learning and how they are motivated and interested in learning. Figure 9 below illustrates an example of differentiation in the various levels of Bloom's Taxonomy, at a story telling task. In the figure the pyramid presents the six levels of the Taxonomy. The parallel table includes juxtaposes the following for each level:

First column: processing skills that students are anticipated to develop in each level.

Second column: suggestions of activities and approaches towards the development of the corresponding skills at each level.

Third column: possible AT that can be used or how to be used if available in order to encourage participation by particular students that use AT as well as engagement with all students in the class.

	Processing skills	Activity/approach	Technology
Create	I plan, I infer, I propose, I invent	Create a new story...	Recording, dictate picture stories
Evaluate	I justify, I recommend I predict, I critique	Convince me to...	Debate with AAC Online blog
Analyse	I compare and contrast, I note relationships, I reason that, I categorize	Find the differences, put in order, draw your family tree...	Online games and apps that are switch or keyboard accessible
Apply	I research, I demonstrate, I solve a problem, I perform	Create a model, predict the end of the story	Recording dictate, accessible simulations
Understand	I reword, I summarize, I explain, I paraphrase	Role play, illustrate, retell a story...	Encourage the use of AAC Use symbols
Remember	I remember, I know, I recall, I define	Match, label, name...	Symbols/pictures Switch/touch accessible games

Figure 9: Differentiation strategies based on readiness and corresponding AT uses

A differentiation strategy based on readiness involves **activities hierarchy**. Such strategies may follow different paths. Activities can be arranged according to complexity, or known vs unknown content, or aimed skills/skills type and level. **Figure 10** illustrates the possible ways activities can be structured and build during differentiation by level. In implementing such strategies, AT can also be employed in the ways presented in Figure 10. Hierarchy of activities may as well correspond to levels of the Bloom’s Taxonomy. Then the actual design and development of the activities considers each student, the available classroom technology, accessibility requirements and any individual AT.

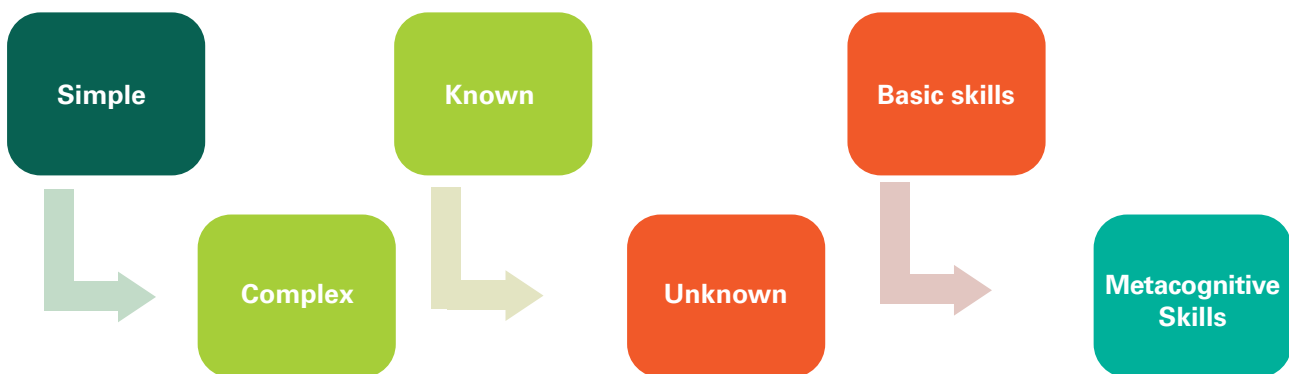


Figure 10: Differentiation strategies based on activities hierarchy by level of complexity, or prior knowledge, or types of skills

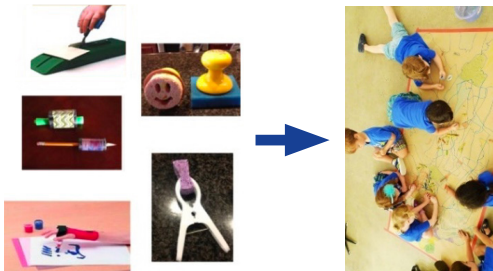

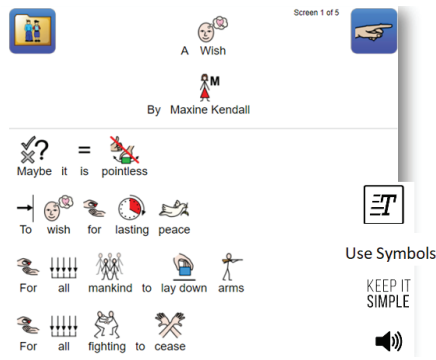
Strategies based on Learning profiles need to [comply to UDL guidelines](#). UDL guidelines support teachers to maintain flexible development of materials and learning environments which activate student’s learning through various channels in perceiving the information and knowledge, in processing, in experimenting and experiencing, and in getting motivated, interested and engaged. These strategies also serve the Representation principle of UDL, while at the same time support compliance to Action and Expression and Engagement guidelines.

It is reminded that UNICEF has developed several guidelines on the implementation of UDL for creating accessible learning materials

- UNICEF Accessible Digital Learning Portal: [Ecosystem of accessible digital content and tools](#)
- UNICEF Accessible Digital Learning Portal: [Accessibility toolkit for digital learning materials](#)
- UNICEF Accessible Digital Learning Portal: Teacher’s guide: [How to make learning materials accessible](#)

Strategies based on interests often involve collaborative activities, learning stations, content relevant to students background, learning profile, experiences and context including accessible materials. These strategies also serve the Engagement principle of UDL, while at the same time support compliance to Representation and Action and Expression guidelines. Table 5 provides some examples of collaborative techniques in differentiation strategies and the use of AT:

Table 5: Differentiation techniques using AT for all

Examples of differentiation techniques to promote collaboration	Examples of assistive technology exploitation
<p>Differentiation technique: Build together</p> <p>Challenges in painting and cutting? Provide options of tools for all</p> <p>Challenges in reading? provide easy-to-read directions and guidance to whole classroom</p>	<p>Provide accessible tools for all</p> 
<p>Differentiation technique: Assign roles</p> <p>Challenges in writing? give the role of the spokesperson with microphone</p>	<p>Give roles that will use the AT</p> 
<p>Differentiation technique: Group project</p> <p>Challenges in vision? Provide resources accessible to screen readers and request accessible project final product (e.g. an audio school newsletter)</p> <p>Challenges in language? Promote development of accessible and easy to read project output and provide equally accessible resource to groups to work on the project.</p>	<p>Make AT an integral part of the project</p> 



Develop ideas

The following cases provide some examples of how strategies and techniques above exploit the use of AT and serve the purposes of inclusive education in terms of: participation, engagement of all learners, collaboration, differentiation and accessibility

Case 5.3 (once again): Let's remember Mary

Mary is encouraged to get involved in collaborative writing activities, using her alternative keyboard. The classroom is engaged in story telling activities, working with children's literature books.

Differentiation Criterion: Readiness à **Differentiation Strategy:** Activities hierarchy

Differentiation Criterion: Learning style à **Differentiation Strategy:** multiple means of presenting information

Differentiation Criterion: Interests à **Differentiation Strategy:** collaboration and links to own interests and experiences

Activities Development

UDL Principles with the use of technology

The story is presented in the classroom using power point with multiple means of representation (image 1): text, images and recorded narration

There is also an option to explore the original book and students to practice reading

In activities sections for inserting responses are clearly defined by highlighting/colour coding



Hi, my name is Matoo.
This is my neighborhood, quiet with trees and a small lake
There is nothing really important here. All important things are in the big city: museums, libraries, parks...
Ah! And a huge iron tower that reaches the sky!

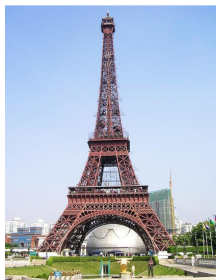


Image 1

Activities are structured in levels

Level 1: Remember (images 2a and 2b)

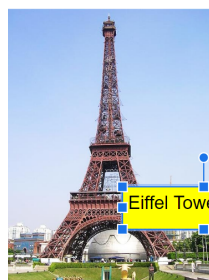
Activity: Name or Match (both options provided to either type, write, say or select)



What is the name of the big iron tower in Matoo's city?



Image 2a



What is the name of the big iron tower in Matoo's city?

Babel Tower

Eiffel Tower

Power Tower

Image 2b

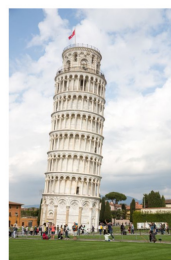
Level 2: Apply (images 3a and 3b)

Activity: Make connections (both options provided to either type, write, dictate or select)

Which other famous towers do you know? Can you recognize some?



Image 3a



If Matoo was in Italy what would be the name of her tower;



This tower is not made of iron. Can you tell what makes it special?



Image 3b

Activities are collaborative

- Students work collaboratively in pairs on shared documents
- Students are encouraged to search the internet, and/or connect to their own experiences
- Alternative keyboard is available to both partners in the pair when activity is implemented in classroom
- Document remains online and students can work asynchronously as well

Case 7: Mike and his peers in Ms Helen's classroom

The class of third graders of an urban primary education school hosts a diverse group of fourteen students with different learning profiles, background and needs. Mike is a child with cerebral palsy and cortical visual impairment who uses AT including a laptop computer, with a switch accessible open software through which he writes with the support of a customized on-screen keyboard. He mainly interacts with his computer and software by touch on his touchscreen laptop computer. The software also allows for the development of multimedia activities with a variety of options. Mike also uses magnifying camera for printed material as well as magnification on digital material. Among the classmates there is also a girl that faces challenges in visual coordination and uses a laptop computer for writing tasks, as well as a bookstand for having printed magnified material at a vertical level. Another two students are identified as students with learning disabilities, while a non-native language speaker has recently joined the class. In addition, another girl in the class has been identified as gifted especially in language and reading, who requires further differentiation.

The challenge in Mike's class is not only to provide accessibility in terms of physical access to learning material, but also to increase motivation and interests for each single student, addressing individual learning profiles, background, language and other competence development. The teacher has received training on AT and more specifically on the activities building software use by Mike. The software proved very useful for the whole class, and hence it is often used on the classroom computer as well, through the interactive whiteboard available in class. Here is an example of a group project in Language course:

Differentiation Criterion: Readiness → **Differentiation Strategy:** Assigning roles and tasks

Differentiation Criterion: Learning style → **Differentiation Strategy:** multiple means of presentation and multiple means for action and expression including physical accessibility requirements

Differentiation Criterion: Interests → **Differentiation Strategy:** collaboration using the technique of jigsaw method and connecting to new student's experiences

Activities Development

Activities using student's interests and experiences, language and alternative presentation

The activity involved the changes of the climate and the weather forecast in different countries

The new student is a refugee from a neighbor country that recently joined the class and does not speak the local language. The teacher helps her to introduce her country and she thought that the weather forecast could be a good opportunity

The use of symbols is initially introduced to facilitated dialogue (image 4)

Use of symbols and two languages

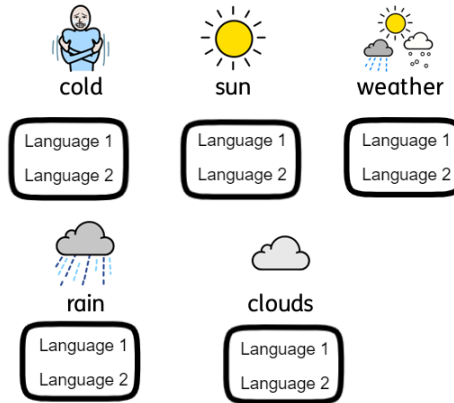


Image 4

Activities are collaborative and structured in levels

Activity: Prepare your own weather broadcast for TV

Jigsaw method: Groups of students focusing on different aspects

Group 1: collect weather information for 3 different countries (local, classmate's and another)

Group 2: collect images for the three countries relevant to weather

Group 3: Put some basic text together to be later updated with work of Group 1 & 2

- **All groups:** Students work collaboratively in small groups.
- **Group 1 & 2:** Students are encouraged to search the internet, and/or connect to their own experiences and use symbols and other visual information
- **Group 3:** Recording is available for students to put together basic text/phrases. Videos and ideas from real broadcasts are also provided by teacher for support
- **All groups:** All material collected and produced is shared on the school/class cloud server
- **For the final product:** Aims and groups are clearly defined, tasks are clearly identified, instructions are clear (see image 5) and material is organized by students themselves (previous group work)

Activities are collaborative and UDL principles are followed

Activity: Prepare your own weather broadcast for TV

Jigsaw method: Students from Groups 1, 2 & 3 forming new groups to compose the forecast

UDL: symbols as well as different options for action and expression are provided

For the final group product of the activity students are provided a template on the software used by Mike. The software provides several options for interaction (image 5)

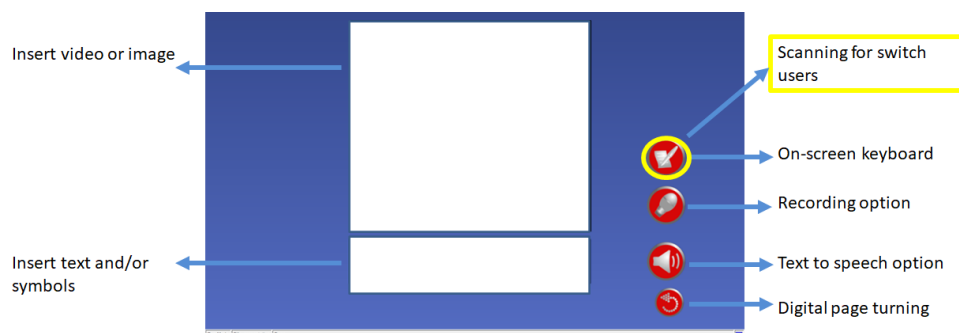


Image 5

Note: See in [Section 4](#) the team approach towards the whole implementation plan for Mike's case and his classroom

Promote digital literacy and digital competence development through activity implementation

Digital competence development of students is a key issue for the effectiveness of the use of AT in education. Through activities that integrate AT students are expected to develop digital literacy and increase their capacity in using their technologies effectively towards digital inclusion. This approach represents a shift from the technocratic model of technology integration in learning through a more human centered model. The first traditional puts emphasis on the integration of technology as a separate curriculum discipline, and in ways that focuses on the technical skills of using technology. For students using AT in school such an approach often results in resistance on behalf of educators that consider themselves not the appropriate person in teaching this kind of skills. On the other hand, the humanistic model treats technology as a tool to enhance other competences including critical thinking, problem solving and decision making as mean of practicing digital literacy. The latter is the approach for effective and appropriate technology integration in the curriculum, learning design and activity development. For AT this is particularly true. AT is a tool for reaching a broad range of competences and claiming rights. Thus, it's use requires the development of digital (AT) skill. Integrating AT as an integral part of students' learning experiences and interaction for, with and on learning content and materials allows students to practice and develop their skills on the use of their own and other technologies.



Develop ideas

Case 2 (continued): Greg's Case through development of digital competences

Source: ENTELIS Network Experiences: *From AAC to Literacy and Digital Literacy*

As introduced in previous sections, by his transition to higher level secondary education Greg was using an eye gaze communication device and software, with the support of symbols. Through the use of symbols and opportunities for communication, Greg gradually developed literacy skills, and moved to more independent use of language for communication. A team approach was consistently followed thought the school years for the effective implementation of AT (more in [Section 4](#)). One of the aims of the implementation plan was the development of digital literacy skills, especially while Greg was going to gradually move from school to adult life. In addition, digital and blended environments started a new reality in education and being connected seemed essential for learning, interaction and reality in education and being connected seemed essential for learning, interaction and communication. During his school life he was always fascinated by technology, and he was frustrated for not being able to attend computer classes, as educators thought that this was impossible for a physically disabled learner. As he very quickly got familiar with eye-gaze as an access method, the team developed the first communication grids containing short phrases for everyday needs and basic social interaction, which were represented both in symbols and written text (image 6 (1)). In a very short time, Greg requested to move to independent phrases and words in order to form his own sentences by reading the symbols (image 6(2)). As he proved to be a very fast eye-gazer, word prediction seemed to be the next step. However, at that time word prediction in mother language was not an option, since the prediction feature was not yet supported by the localized software. Hence the team had to develop customized prediction cells which in reality were numerous sequences of interconnected grids (image 6(3)). This was first implemented in verb forms and tenses for the sake of saving time to the user. Nevertheless, it proved to serve one more very important

purpose: reading (literacy) skills. As this pattern of “customized prediction” was actually the repetition of words in different forms, supported by symbols with indicators he started making connections between symbols, letters (as graphemes) and the sound of these (as phonemes). As a result, he soon requested to move on to cells with known words without symbols and finally to the use of an onscreen keyboard. Soon the prediction feature was further developed he was then able to compose utterances independently and use a variety grid sets for communication.

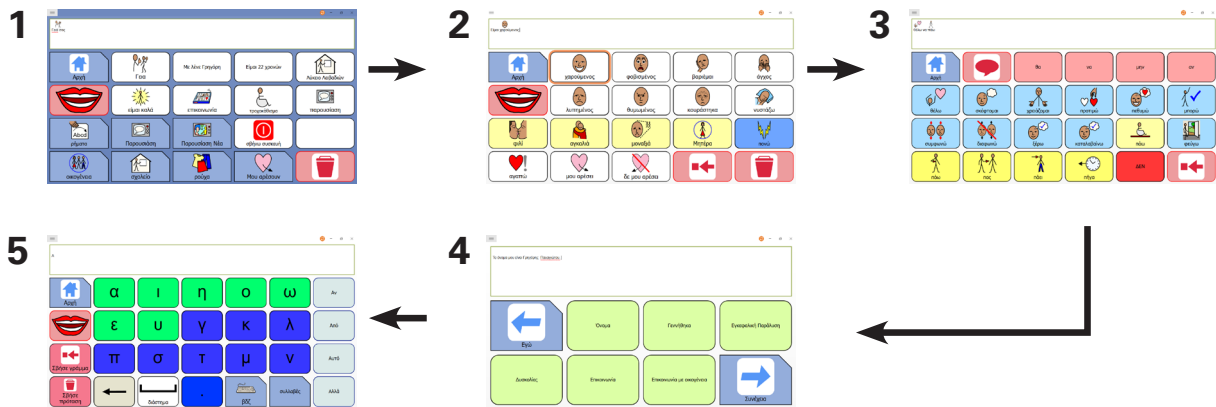


Image 6

At the same time, the use of symbols as well as the navigation through his communication system provided a very good experience in accessing other computer applications through his device and acquiring a better understanding of the digital world. As a result, starting from access to Windows Media Player and listening to music, Greg started using using email, social media, skype and the internet on a daily basis (image 7).

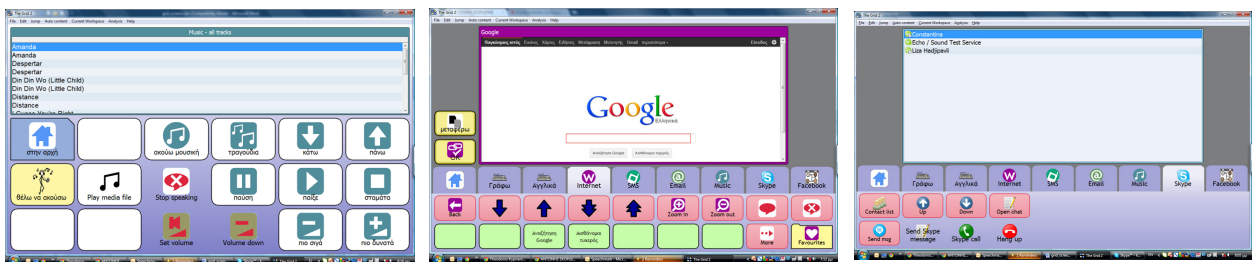


Image 7

Check materials’ compliance with UDL and accessibility

A final important strategy in developing and implementing learning activities with the use of AT is application of accessibility requirements and universal design guidelines. Tools and approaches towards this aim are presented and discussed in various other Sections of this Guide. Nevertheless, a summary table for analysing the activity and the tools to be used is provided for additional guidance. Of course, this is not considered an exclusive approach, but rather an example of helping teachers putting everything together and aligning activity objectives to UDL guidelines, technology used, and tools to make material accessible:

Table 6: Analysis of learning activity focusing on UDL alignment (suggestion also compatible to online learning activities)

Learning Activity	Universal Design for Learning	Methodology and Model	Technology and Accessibility
Activity Description	Principles & Guidelines	e.g. F2F, Distance, Synchronous, Asynchronous...	e.g. Teleconference/ captions, Group work/ headsets
Learning Objectives and Learning Outcomes	Engagement		
	<i>Recruiting Interest</i>	Approach	Means / AT
	<i>Sustaining Effort & Persistence</i>	Approach	Means / AT
	<i>Self-Regulation</i>	Approach	Means / AT
	Representation		
	<i>Perception</i>	Approach	Means / AT
	<i>Language & Symbols</i>	Approach	Means / AT
	<i>Comprehension</i>	Approach	Means / AT
	Action & Expression		
	<i>Physical Action</i>	Approach	Means / AT
	<i>Expression & Communication</i>	Approach	Means / AT
	<i>Executive Functions</i>	Approach	Means / AT

Reminder 1: UNICEF resources on UNICEF Accessible Digital Learning Portal:

- [Ecosystem of accessible digital content and tools](#)
- [Accessibility toolkit for digital learning materials](#)
- [How to make learning materials accessible](#)

Reminder 2: Check available AT features and issues for consideration (see [Section 2](#))



Think – Reflect – Act

The challenge- Here is a case for you to reflect and design:

Your class: In a mixed ability class of fifth grade in primary school (you can also use your own class as an example)

- **Children readiness:** analysed in lower, medium and above medium levels.
- **Learning profiles:** The prevalent learning profiles of all students include visual learners, auditory learners and learners that prefer motion-sensory stimuli and learning.
- **Classroom main interests:** these have been largely developed through previous years in primary school and involve music, theatre, artistic work, crafts and technology.

- **Children with disabilities in the class:** a child with visual impairment, of medium readiness that uses a magnifier and a child with intellectual disabilities assessed in a lower to medium level of readiness.

Your task: During the week devoted to children’s rights at your school and you need to develop a couple of activities (you can also reflect on a different subject of your choice)

- How would you differentiate the content, the activities, the learning environment in order to respond to the various levels of readiness, learning profiles and interests of this class?
- Which differentiation strategies and techniques seem useful?
- What kind of technology would you employ to make face to face and some online learning activities accessible for all students?

Make the connections: With which areas of the ENTELIS self-assessment tool that you have previously used would you link this action?



Additional Resources and Tips

Additional Resources and Tips

- Failing to use AT appropriately or disregarding accessibility often constitute an indication of ablism, disablism and segregation. Here are some examples and the response to those:

- I don’t have students with disabilities every year in my class, so I don’t need to have accessible materials all the time.
- Accessibility does not allow beautiful design for my handouts and slides

The response: Accessibility should be an embedded feature of all elements of the learning design. Anyone can benefit! Accessible means simple and clear!

- AT distracts the user and other students in the classroom
- AT is an individual issue and not a matter of the whole class. Special Teachers need to work with this in one-to-one sessions

The response: AT should be introduced as an integral part of the learning environment and a tool for participation like any other learning tool

- AT is expected to solve the problem, why do I need to adapt my instruction?

The response: AT is a tool not a purpose. You have the tool. You need to opportunity to use it in order to serve its purpose.



Section 4: Whole school approach and system level implementation



Overview

This Section focuses on the importance of considering AT implementation in education as part of a more comprehensive planning at the micro-system of the classroom practice, but also at a meso-system of the school and local community and the macro-system of the broader AT service delivery system in education, including resource centers or other forms of services. Regarding classroom practice and planning, the main issues have been discussed in [Section 3](#). Nevertheless, classroom practice is not independent from the whole school culture, policies and overall practices. In addition, an implementation plan is largely affected by the macro-system of service delivery, in terms of legislation and regulations (e.g. ethical issues, use of the internet, use of cameras etc), in terms of funding or availability of other material or human resources, and other policy decisions that can be central. Thus, in this section of the Guidelines, the main steps and key-points of the process of identifying, implementing and evaluating the use of AT are summarized, bringing together the roles of various stakeholders. Ideas of how to practically develop an implementation plan are presented, and the way this can be connected to the whole school culture, policies and practices.



Can do: Competences relevant to this section

Main assumption: Teachers, school staff and involved stakeholders need to work collaboratively in a whole school approach.

- To distribute school resources fairly in classroom supporting inclusion.
- To be aware of the need to stay up-to date with innovative practices in the use of AT in inclusive education.
- To recognize the limitations of AT resources and seek continuous improvement.
- To manage set up, maintenance, upgrades and safety of AT.
- To communicate and collaborate with school assistants and other stakeholders (e.g., parents, other teachers) for the implementation of the AT within the school setting.
- To plan, teach, review and solve problems on the use of AT following a team. approach in inclusive education by getting involved in multi-disciplinary teams.
- To be aware of the need to stay up-to date with innovative practices in the use of AT in inclusive education.
- To implement and share with colleagues self-reflective practices for the use of AT for inclusive education.

- To support children's parents and colleagues through the AT selection and funding processes/mechanisms.
- To recognize possible safety issues related to ICT/AT use in order to plan mitigation/reduction strategies.
- To manage communication with national or local authorities for issues of AT.
- To encourage participation in projects and innovations using AT in inclusive education.



Know – Understand – Analyse

Key points to remember

- Implementation of the use of AT for inclusive education is an issue of teamwork within the school and beyond
- Digital and AT competence development through training is essential for the students using the technology and all involved stakeholders
- Monitoring and evaluating implementation involve self-reflection practices, data collection from involved and responsible persons, and observation of students' participation and engagement.

4.1. Working together for planning effective implementation



Key point: Implementation of the use of AT for inclusive education is an issue of teamwork within the school and beyond

Teamwork for the effective use of AT starts well before the actual implementation in the classroom. After identifying the need for AT teachers, schools, parents contact the available AT services to identify and select the most appropriate technology. As highlighted in [Section 2.2.](#), there are countries that have well established AT specific services, others that include AT provisions in other sectors, such as health, education, social welfare, with either special attention to AT or non-specific to AT provisions, and others where AT is at least officially absent from policies and services.

Team approach at service level

In any case, the first identification of the need for AT by teachers and the school team leads to a process of assessment, that is often multi-disciplinary and collaborative. During this process, the teachers need to work closely with the AT and other professional and collaborate with the family and the student in order to identify the best technology and specific adaptations that maybe necessary (See [Section 2](#)). The information collected and negotiated during that process are very useful for classroom implementation (see [Boxes 5 to 7](#)). Additionally, close contact and collaboration with the AT service delivery teams is necessary for the possibilities of supplementary equipment and/or software, customizations, and other amendments or adaptations may occur.

Collaboration and teamwork at this level is essential especially for facilitating the transition between education levels as well as cross-sectorial communication and procedures. In many countries AT services are fragmented and there is no collaboration, common data or exchange of

information between the various systems; e.g. there are states where the use of AT in education is funded and managed by the Ministry of Education or educational authorities, whereas the use of AT by the same child at home needs to be managed (and funded) separately by the Ministry (or other authority) of Social Welfare. Similarly, very often transition of children using AT from primary to secondary education, especially when systems are completely split is challenging. Challenges are even larger when transition is from secondary to vocational education and then to support for employment. Teachers can provide essential information on what works in the classroom. For cross sectorial collaboration to be effective, the following should be ensured:

- **Consistency in procedures:** assessment, implementation and follow-up are based on same policies and processes
- **Multi-disciplinary team approach to IEP development:** Same stakeholders are involved, and if changes are mandated by the system a fixed core team is sustained (for instance child and family, AT coordinator)
- **Official data records:** Keeping official portfolios for learners AT use, progress, objectives, participation, challenges and solutions is essential for transition
- **Training:** Established training programmes for all educational staff across levels with compulsory core in-service professional development on AT and inclusive education is a mechanism for smooth transition

Team approach at school level

Moving into the adoption of the technology in the school environment, awareness and information of the school staff and key persons is important. The use of mainstream or AT individually by particular learners or as a shared learning tool in an inclusive classroom, entails several issues that concern the whole school. Apart from installation, set-up, fitting, adaptations etc., where the initial team may also be involved, other issues to be considered involve safety and security of the equipment, maintenance and technical support, location in the classroom as well as storage issues, updates and continuing training when necessary. Moreover, classrooms and students are not a single teacher's responsibility. Often different disciplines and curricula subjects are taught by different educators, while other persons are involved in the learning process: i.e., specialists (i. special teachers and speech and language therapists), support staff, teacher assistants, etc. Thus, in addition to training (see [Section 4.2](#)), the school team needs to hold a common understanding of the importance of the use of AT, its potential and benefits for equal opportunities for participation. Developing a digital and AT enhanced inclusive culture in the school is essential.

Team approach at classroom practice level and beyond

Implementation in classroom and integration of the technology in the learning design is discussed in [Section 3](#). In order to make classroom planning effective, there needs to be continuity and coherence across curricula elements, subjects, and learning experiences, including the use of the technology at home. Thus, classroom implementation planning has a variety of aspects that require teamwork and collaboration. These are:

- **integrating technology in lesson design and learning environment** (i.e., in learning objectives, in teaching and learning activities, in material and content and in learning environment accessibility). Teamwork at this level entails first of all collaboration with all students in class (consider prior knowledge and experiences, as well as expectations, reactions and feedback during class), and collaboration with other professionals and educators working on the particular students IEPs is essential, in order bring individual objectives in classroom curriculum (see IEPs in [Section 3.2](#)), as well as teachers that maybe involved in [co-teaching](#) (in cases this is a school/system established practice).

- **development of learning and learning assessment activities, tools and materials.** Teamwork at this level involves possible collaboration between teachers engaged in co-teaching. In addition, for the development of universally designed and accessible material collaboration with accessibility experts, or people that can provide guidance and support for accessibility, maybe necessary. Learning activities integrate AT on the basis of differentiation and UDL, which are pedagogical approaches that are also learner centred and require co-design with students themselves and other fellow teachers.
- **transfer and continuity at home:** families are an integral part of the whole implementation planning and prior processes. They are involved in all steps of decision-making, and they are also the main collaborators for keeping consistency and continuity of the work done at school. Using AT for inclusive education to increase participation of particular students as well as engagement of the whole class is connected to synergies with families'. Home-school relationships and partnerships with parents have been for years in the centre of school improvement, students' progress and engagement and inclusive education. In the case of technology and AT integration, this is even more essential as consistency, attitude and acceptance needs to be reinforced and support for and by families too.
- **transfer and continuity in other settings:** children live, function, interact in various contexts, activities and phases of their daily life. Thus, the use of AT is not only a matter of school, classroom and formal education. All stakeholders and persons involved in every activity of a child's life need to be informed, educated and engaged in supporting the effective use of AT, and accessible environments and opportunities for participation with AT. Teamwork at this level is a facilitator for transition, cross institutional and cross sectorial collaboration and a catalyst for educational and social inclusion.

An additional AT implementation plan is included in [ANNEX 5](#), as recommended by the US National AT Research Institute (Bausch and Jones-Ault, 2008), which organises the above points into an easy-to-use table.

4.2. Training and competence development for effective implementation



Key point: Digital and AT competence development through training is essential for the students using the technology and all involved stakeholders

One of the most important factors for the effective and successful use of AT “in creating inclusive learning environments is the systematic development of competences of all actors” (Hoogerwerf, 2021, p. 110). Not everyone has the same background, prior experience and role in education that would priorly provide knowledge and skills in implementing AT, training is essential when it comes to developing and implementation plan.

Training can have various formats, modalities, duration and focus. What is initially necessary, is to:

- Identify the needs of training for each involved stakeholder, according to the requirements and characteristics of the student(s), the learning environment, the people involved and their roles.
- Acknowledge that training should consider also follow-ups not only of the implementation of the technology, but also the competence development of the various actors, the ongoing support, and additional training that may be necessary in next steps.
- Keep up to date with technology, as well as with pedagogical approaches and with students' progress and evolution

Reminder: The [SELFIE Tool](#) of the European Education Area can be useful in identifying existing competences, gaps and needs in how technology is used to improve teaching and learning. When using SELFIE be mindful for issues on inclusion, accessibility and disability.

Then, it is important to identify

- the type (e.g. short-term or long-term, group or individual training) and modality (e.g. face to face, on the-site or elsewhere, blended, online)
- the focus of training (e.g. on hands-on practice, technical skills, pedagogical perspectives)
- for whom each type and focus of training is more appropriate

Training for empowering students using the technology

Students' training refers to both individual students with disabilities for the use of personal equipment, and all students using any kind of technology for learning. For individual users of personal AT, particular skills and knowledge for the use of the AT is often expected to be taught prior the implementation in the classroom. However, this does not need to be a segregated process, neither a reason for exclusion from specific classroom activities. As discussed earlier, AT competences can be included in the IEP as well as supported by other professionals involved in the school team. Students are not expected to become expert users in individual sessions. Providing the opportunity to consistently use the technology in learning activities, facilitates practicing and digital literacy. This is also valid for all students in the class. Opportunities to use the technology in various ways as describe in [Section 3.3](#) leads students in digital literacy through encouragement to participate, be engaged and reach expected outcome.

In addition, students training for AT can also be included in other curricula subjects specific to technology (i.e., most curricula have an Information Technology subject or similar). Including AT and accessibility of mainstream technology in such courses is not only development of a broader digital literacy, is also awareness and competence development for all students in relation to accessibility. Training approaches should be informed by competence development frameworks for AT users, that identify knowledge, skills and attitudes for digitally competent students and future citizens. Examples are listed here:

- [Guidelines for Lifelong Learning in AT communication, computer access and environmental control](#), from the Keeping Pace with Assistive Technology Project (KPT)
- [ATLEC Curriculum and Handbook – Assistive technology Competences for Users](#), from the Assistive Technology Learning Through a Unified Curriculum Project (ATLEC)
- [DigComp 2.2: The Digital Competence Framework for Citizens](#), A European Commission Publication

There are also examples in which training processes and platforms are co-designed with AT users/ students, where competence frameworks focus on the synergies between trainers and trainees. [Right to Connect Now Project](#) as well as [DigiReady Project](#) are examples of such approaches, though the focus on young adults and vocational education students, rather than younger students in education.

Training for educators and school staff

Teachers and other school and education staff that are constantly involved in the process of implementing AT in learning, and also involved in supporting students with disabilities to develop their own digital and AT skills, require continuous professional development and training. However,

this does not exclude the on-site and on-the spot training for specific assistive technologies, and for possible individualized needs of particular students. Teachers and school actors training includes development of practical skills in setting-up, configuring, and using AT. In addition, it includes competences in using the technology for [developing learning activities and materials](#), and how these are connected to the inclusive education pedagogies. In addition to this Guide, UNICEF and other initiatives offer practical guides for hands-on examples on how to make accessible material and integrate accessibility and AT in learning.

Similar to students training, approaches to teachers and school staff training, are expected to be informed by relevant competence development frameworks. Some examples, referenced and used in these Guidelines are:

- [ATLEC Curriculum and Handbook – Assistive technology Competences for Trainers](#), from the Assistive Technology Learning Through a Unified Curriculum Project (ATLEC)
- [DigCompEdu: The Digital Competence Framework for Educators](#), A European Commission Publication
- [Educator’s Digital Competence Framework \(EDC, 2022\), developed by UNICEF](#)
- [SKATE Competence Framework for Early Childhood Education Teachers](#), from the Skills & Knowledge on Assistive Technology in Early childhood inclusive education Project (SKATE)
- [ENTELIS+ Competence Framework for Trainers](#), from the ENTELIS+ Project

Training for other actors and stakeholders

Other specific stakeholders and actors, such as family and carers, as well as other educators or persons involved in children’s lives, also need to receive customised training sessions focusing on the particular technologies and the various settings in which they will be implemented. Though in the cases of family and carers, often training is more specific to particular children needs and technologies, the aforementioned competencies frameworks are also useful. The role of this group is also a determinant on the focus and type of the training. Families together with the child are the source of information for students preferences, life-style, profile outside school, that are necessary in decision making of designing the technology supported activities in all settings. In addition, families are often the key for the links between class-work and home and as well as extra-curricula activities, and the consistency in the use of technology. Thus, training needs to be focused on the development of practical skills in setting-up technology, as well as how they can create opportunities and motivate children to use the technology at home in learning and other activities. Partnership with parents and home setting is essential for the effectiveness of inclusive technology enhanced learning environments in and out of the class. Emotional support of and by the family is another aspect for keeping motivation and discourage possible abandonment of AT.

Tips for targeted training

- **TEACH** particular skills individually where necessary and provide lots of opportunities for practice in various settings. Different training sessions for different groups of actors maybe necessary
- **LINK** training to each stakeholder’s role and responsibility
- **PEER-training** is effective. External actors/service and product providers maybe the trainers. However, having trained trainers within the school unit is a key for success.

- **JOINT** sessions for the whole team or small groups is also essential, in order to realize the connections and links between the roles as well as the activities in the broader learning experience
- **EXPLOIT** existing frameworks. Competences chosen for each training situation vary in terms of education level, role of the educators/school staff, prior knowledge and experience.
- **DECIDE** the length, duration, location and modality (face to face, blended, remoter) of the training based on trainees needs and profiles. Parents do not have the time for long and theoretical trainings. Teachers too, but for teachers methodological and theoretical background is often essential for building foundations for the practical aspects.
- **PROVIDE** various opportunities. Training is not once-off. Support sessions, coaching and monitoring is necessary for the whole team, starting before and continuing during the implementation and the follow-up.

4.3 Monitoring, reflective practice and self-evaluation for effective implementation



Key point: Monitoring and evaluating implementation involve self-reflection practices, data collection from involved and responsible persons, and observation of students' participation and engagement.

A critical part of an implementation plan is the monitoring and evaluation of the process of the use of AT for inclusive education from various perspectives. These involve the regular evaluation of the technology effectiveness and satisfaction of students' needs, as these can change over time. Also, technology itself, hardware and software, many need to be upgraded or new AT may be required. In addition, monitoring should continuously consider the needs of the whole class in terms of access to technology, its actual use by all learners, its added value and appropriateness in relation to the curriculum, the learners' profiles and differentiation strategies.

Similarly, to assessment process and implementation planning, monitoring and evaluation are also a teamwork, and should involve various stakeholder such as: the child and his/her family, AT service delivery system/AT experts, school professionals and health professionals, and then maybe providers, funding agencies, providers of technology as well as designers for customized adaptations. Strategies of monitoring and evaluation may include the following:

Teachers' reflective practices

Self- reflection involves a thoughtful look about the teaching and the teaching process, in terms of 'what was done, what could have been done, and what should be done' (Galvez – Martin, 2003: 59). It allows educators to evaluate themselves, providing an understanding of how they deal with past situations, and what can change to improve their own actions and engagements. Communities of practice and group-work are considered more effective for self-reflection, since communicative frameworks allow educators to interact, exchange ideas and learn from each other (Devi et al., 2021). The various reflective practice models identified in literature share the principles of critical assessment of own practice in order to identify possible solutions to educational concerns for improving learners' experiences. A number of strategies can be used towards this end, which may include personal journals, diaries, portfolios, tables, mind maps, lists and bullet points, recordings, creative representations and group and peer-feedback work. For example, an older version of the UDL checkpoint was presented in a table, introducing teachers to a tabular

strategy of self-reflection on how AT and other means is used to address UDL principles. The newer versions the checkpoints is now elaborated further online, but it may as well be easily copied into reflection tables. An idea could be the amendment of [Table 6](#) into such a table, not only for initial design but also for self-reflection and evaluation during and after implementation. Similarly, example in [ANNEX 4](#) provides spaces for reflection. In all cases, self-reflection upon UDL guidelines should be based on additional criteria on how these are connected to differentiation strategies and what has been the position and role of AT.

Criteria and observations on the integration and transferability of the IEP in the classroom curriculum and practice as well as the participation and engagement of all students

The ICT and AT should be integrated in the Individual Education Plan (IEP) of the child but at the same time we need to transfer the relevant objectives and learning outcomes in the mainstream – inclusive classroom practices. The provision of AT often functions like any other service that provides support in education specifically to children with disabilities, and as such it may become a factor of segregation, rather than a factor for promoting inclusive education. One of the threats is the fact that AT and it is not recognised as an integral part of the educational programme of the student, neither at the level of the individual educational plan (IEP), nor at the level of the inclusive classroom lesson plan. Therefore, the assessment and the procedure to provide AT should not only include a suggestion regarding the equipment and tools that will be used by students, but also the entire implementation regarding participation, learning, communication and the goals of inclusive education. Including AT in the individual educational programme does not mean that inclusive education is fostered.

Thus, continuous monitoring of the process and involved team's reflection should consider criteria that examine how AT is transferred from the individual level to the use in the mainstream classroom, and specifically to principles of inclusive education. These criteria may focus on monitoring aspects (also mentioned above):

- Professionals' (including teachers) collaborations with child and family for transition from the individual level (i.e. technology for individual needs), to the general level (i.e. technology for engagement, participation and quality of life).
- Teachers' own role in organising and creating educational opportunities for the use of AT in non-isolating ways in the learning environment.
- Extent in which AT is connected to curriculum.
- Ways of managing the access of students to technology and relevant configurations and set-ups
- Encountering quality participation of the student and interaction with peers
- Broader use of the AT in the learning process and beyond, including other settings (e.g. communication devices during breaks)
- Transfer of competences and the use of AT per se to the next levels of education, or to vocational training or employment opportunities.

Whole school approaches to self-assessment of school culture, policy and practices

To promote inclusive education is not only a matter of a single child success or even a single class progress. It is also a matter of identifying gaps or opportunities in the whole school culture, policies and practices that may hinder or support the effective implementation of AT for inclusive education. Vigorous and conscious involvement of school communities is a key to achieving

sustainable changes in education. Whole school self-assessment can be a fundamental force in achieving improvements. The use of structured frameworks and tools can further facilitate schools to engage in collaborative reflective practices (Mavrou and Hoogerwerf, 2021). When it comes to AT and inclusive education such practices have an exceptional role, since success of implementation lies deeply in team-work and multi-disciplinarity. Whole school approaches to self-assessment may as well serve as tools for setting the goals towards inclusive digital education culture, policy and practices in a school, and thus promote the use of AT and accessibility. Such approaches facilitate school teams to further consider a strategy for development and implementation of an action plan, as well a strategy for monitoring and assessing the process.

An example of such a tool is the [ENTELIS self-assessment tool for schools](#). The tool is proposed at the end of [Section 1](#) (see [Think-Reflect-Act: 3](#)) as an initial school self-assessment exercise for identifying any good practices in a school as well as gaps, and the areas in which the school should pay attention and develop actions. In a school focused tool such as this one, the target areas for self-assessment include:

- **School culture and policies:** Areas in this section refer to whole-school management and planning, involving the commitment of the school to the right to inclusive education for all students, the use of technology and the promotion of digital literacy for all. In addition, it involves whole school environment, focusing on accessibility, resources, communications and universally designed processes. Student and Staff potential are also part of the school culture and policies, and they involve learner centred process, AT and reasonable accommodations policies and provisions, professional development for staff and digital competences development for all.
- **School practices:** Areas in the practices section are more aligned to curriculum and IEPs planning and implementation, teaching and learning strategies including differentiation and UDL, classroom management and opportunities for participation with the use of technology, and learning recognition and support through constructive feedback, and opportunities for success.

The use of such tools is twofold. First, they can serve as a means for initial self-assessment and establishment of an action plan. When areas of attention are identified, the use of AT as described in these UNICEF Guidelines can be part of the action plan following the initial school reflection on own culture and practices. Second, such tools can be re-employed for monitoring and evaluating the whole action plan, upon the same indicators used for initially identifying the gaps. The aim is to go back to the beginning, check what went well, what needs further improvement and how new or existing actions can be (re)defined.

In conclusion, an implementation model is the result of an ongoing collaboration, observation and review of the different practices that focus on all students and aim to use technology as a tool to practice inclusive education pedagogy.



Develop ideas

Case 2: Greg's Case – The implementation plan in a summary table

Following the second phase of the assessment as presented earlier, an implementation plan was collectively developed to support Greg in effectively use his eye-gaze augmentative and alternative communication device in secondary education. The following implementation plan is part of the broader plan and [focuses on the development of the AT and digital competences](#) (See Case 2 in Section 3.3).

Meetings / Sessions Persons involved	Objectives (examples)/Roles	Activities (examples)
Student (meetings with the AT support team in and out of school) Meetings organised regularly for a year with scheduled breaks in between	<ol style="list-style-type: none"> To master eye gaze To use standard cells To practice in word prediction To participate in conversation To initiate communication 	<ol style="list-style-type: none"> Eye gaze games Develop Grids including basic needs' Use of onscreen keyboard Structured dialogue Conversations regarding the News Broadcast, which was one of his main interests
Family	<ol style="list-style-type: none"> To collect information for device content To create opportunities for communication 	<ol style="list-style-type: none"> Design and development of content, starting from basic grids Include AT in everyday activities at home Roles & tasks among family members
School	<ol style="list-style-type: none"> To collect information for device content AT in IEP & Classroom 	<ol style="list-style-type: none"> Design and development of content – basic Development of schedule
Student, professionals & family	<ol style="list-style-type: none"> To develop basic AAC software skills To develop basic eye-gaze set-up and configuration equipment skills 	<ol style="list-style-type: none"> Training sessions (on the site)
All involved stakeholders (Additional issues)	<ol style="list-style-type: none"> To develop a troubleshooting mechanism To develop school awareness and information To develop a strategy for technology security and transfer 	<ol style="list-style-type: none"> Low-tech backup solutions Regular team Meetings Presentations at staff meetings

Case 7: Implementation plan in the meso-level of Mike’s and Ms Helen’s classroom			
Accessible School Environment: Built Environment, Learning Environment, Digital Environment			
Built Environment: Early assessment of the school space			
Enter School	Move in school	Reach classroom	Participate in Learning
Designated Parking Space for Parents	Ramps Lift for first floor	Central location of classroom Noise-proof floor Ramp	Assessment and selection of AT
Assessment and Choice of AT: A team approach			
Collaborators	Technology	Adaptations	Training
<ul style="list-style-type: none"> • Student & Family • Service provider: Ministry of Education • Scientific consultants: Research & Academic Institution, private occupational therapist • School team coordinated by the school Head: classroom teachers, personal assistant, special teacher- c 	<ul style="list-style-type: none"> • Laptop computer • Magnification • Interactive whiteboard • Accessible activities builder software • Customised on screen keyboard • Large touch-screen • Funded by State • Adapted desk • Wheelchair 	<ul style="list-style-type: none"> • Large print text • Digital version of text-books • Customized writing material compatible with customized on-screen keyboard 	<p>Who</p> <ul style="list-style-type: none"> • Student • Family • All teachers • Personal assistant <p>By Whom: Collaborators</p> <p>What:</p> <ul style="list-style-type: none"> • Technical aspects of AT • Pedagogical aspects for activity developments • Activities software specific training <p>Where:</p> <ul style="list-style-type: none"> • On-site (school) • At a university premises • Online (during covid-19) • On-going coaching • Individual sessions (with occupational therapists, special teacher)
Implementation Team: Inter-Disciplinary Collaboration			
Members		Roles	
Classroom Teacher		Lesson Planning and Activities Development Set-up and installation of equipment in class Differentiation of material and learning activities	
Special Teacher and Speech and Language Therapist		Lesson Planning and Activities Development in collaboration with classroom teacher Individual sessions: IEP objectives for use of technology and other curriculum objectives Development of differentiated material	
Family		Information for classroom accessible material Practice at home Input in activity planning and development	

Personal Assistant	Set-up and installation of equipment in class Support for the use of technology in classroom Development of differentiated material with teachers guidance
Rehabilitation professionals out of school	IEP in individual private sessions AT competence development Monitoring and consultation for school implementation
Academic and Research Institution	Training Monitoring and consultation for school implementation Volunteer students for differentiation material development
Learning Environment: Individual Educational Program (IEP)	
Aim	Maximization of student's capacity and participation
Foundations	Student's existing knowledge and skills
Assistive technology	AT competence development objectives AT as tool for participation in curricular activities
Learning Profile	Learning objectives and expected outcomes build on all aspects of learning profile: auditory skills, strong memory, strong verbal communication, peer learning and collaboration
Learning objectives	Short-term – small steps and easy to achieve Long-term – aligned to school grade / national curriculum objectives
Learning Environment: Curriculum Differentiation	
Objectives	Following IEP and aligned to national curriculum
Tools and Material	Accessible and adapted towards compatibility with personal AT
Content	Simplified and included in collaborative learning activities, peer interaction and personal experiences
Outcomes	Differentiated and documented assessment (project based, accessible assessment formats)
Digital Environment: Digital education during covid-19	
Synchronous Learning	Teams Platform Personal folder for each student Accessible content in personal folder Use of the individual software to present content for all class Home use of large screen and accessibility requirements
Asynchronous Learning	Individualised tools compatible with AT software Accessible content in personal folder
Stay connected	Informal online meetings organized by classroom teacher for socialization of all students in class Informal online meetings organized by various parents for interaction and communication between students



Read – Search – Consult

See some more implementation examples at [UNICEF's Accessible Digital Learning Implementation Examples](#)

[UNICEF 2021 Practical Guide to Blended Learning](#)

[UNICEF 2020 Guidance on Distance Learning Modalities to Reach All Children and Youth During School Closures](#)



Additional Resources and Tips

A summary of the main points for implementation focusing more on Early Childhood Education and early primary years can be found in the [SKATE Project Guidelines Sections 3.2.3 Strategies in Using ICT-AT and 3.2.4 Integrating ICT-AT in Early Childhood Education and Care](#).



Think – Reflect – Act

Remember the ENTELIS self-assessment tool for schools? In [Section 1](#) the tool was used for an initial self-reflection of your school culture, policy and practices, through the short version. Now is time to think of implementation and check your school readiness in more detail.

Try out the extended version of the [ENTELIS self-assessment tool for schools](#) [English].

Extended version: includes four descriptors of good practice for each area. The extended version also includes typical questions that help you to understand the criteria and to assess at what stage of achievement you are. It further provides guidance in the definition of an action plan. In that case the worksheets provided will become collaboration tools between staff members. Give it a try! Identify gaps, identify strengths, suggest actions and build a short-term implementation plan!



ANNEXES

ANNEX 1: AT Assessment for Beginners: Three Steps and Five Tips to Assistive Technology Assessment (Katerina Mavrou)

3 Steps and 5 Tips to Assistive Technology Assessment AT Assessment for Beginners <i>“Flexible, Collaborative, Pleasant, Decision-Making, User-Centered Process”</i> <i>The 3-Step Process</i>	
Step 1: Organize and Prepare:	
Tips: User-Centered & Collaborative	
1.1. Collect information	<ul style="list-style-type: none"> ▪ Previous reports from other professional ▪ Interviews with the student, family, professionals ▪ Observation of student and environment – on and off task
So as to:	
✓ Define goal(s): What does the student wants/needs to do? (tasks & activities)	
✓ Define barriers: Which are the barriers that AT is expected to remove?	
✓ Define needs & abilities: What can the person do? What are the difficulties and issues to consider regarding all aspects of development (motor, sensor, cognitive, emotional)	
✓ Define existing AT used: Does the user already use any AT ? (what, how, when)	
1.2. Set up the team	<ul style="list-style-type: none"> ▪ Remember: The student is part of the team! ▪ Talk to other professionals – invite them to the assessment ▪ Get the family involved (observe and/or participate) ▪ However! <i>Avoid crowded assessment settings – decide who is important to be there</i>
1.3. Prepare the environment	<ul style="list-style-type: none"> ▪ Define the venue where the assessment will take place – Make it accessible! ▪ Prepare the equipment/tools that will be used for the assessment ▪ Be flexible! You may need to change plans!
Step 2: Actual Assessment	
Tips: User-Centered, Collaborative, Pleasant & Flexible	
1.2. Be organized	<ul style="list-style-type: none"> ▪ Follow well-structured tasks (mind flexibility!) ▪ Have all documentation in hand ▪ Have all equipment ready ▪ Allocate roles (if needed) with other involved professionals

1.3. Be flexible	▪ Do not pre-assume
	▪ Have Plan B (at least)
	▪ Improvise!
1.4. Be pleasant	▪ Provide motivation!
	▪ Make the assessment fun (especially for kids)
	▪ Make short breaks
	▪ Provide positive feedback on tasks
1.5. Observe and record carefully	▪ Consider all aspects (physical/motor, sensory, cognitive, emotional)
	▪ Record tasks & performance
	▪ Video -record (if appropriate)
Step 3: Actual Assessment	
Tips: Decision-making, Collaborative & User-centered	
1.1. Collaborate	▪ Discuss with the student and other involved individuals about possible solutions
	▪ Get all factors under consideration (funding can be one of them!)
1.2. Be specific	▪ Describe process and tasks
	▪ Describe performance in all aspects observed (access, communication, processing etc)
	▪ Make suggestions for AT
	▪ Document your suggestions
1.3. Follow-up	▪ Make suggestions for implementation
	▪ Make suggestion for initial objectives
	▪ Provide for future meetings
	▪ Remember! People are changing, needs are changing, technology is changing!

ANNEX 2: Template for assessing lesson plans in terms of barriers and opportunities for the use of assistive technology for inclusive education (SKATE project training materials)

Learning Objectives	Identified Barriers	Identified inclusive elements	Suggestions for addressing barriers
Materials	Identified Barriers	Identified inclusive elements	Suggestions for addressing barriers
Activities	Identified Barriers	Identified inclusive elements	Suggestions for addressing barriers
Assessment	Identified Barriers	Identified inclusive elements	Suggestions for addressing barriers

ANNEX 3: Lesson plan template to facilitate the use of assistive technology for inclusive education

Source: Adapted from SKATE project

Lesson title:

General information:

Time:	
Grade/level:	
Main Objectives: (formulated having in mind the principles of UDL)	
Brief Classroom Description and prior knowledge and experiences of students	Number of Children Children that use personal AT Other details
Materials/Equipment: (Including AT and other technologies)	
Tips	

Learning Activities	Design and approach	Technology / Materials	UDL Principles	Classroom organisation
Introduction (description)				
Activity 1 (description)				
Activity 2 etc (description)				
Assessment (description) (formative/ summative)				

ANNEX 4: Activity Analysis and Mapping for the use of assistive technology towards Universal Design for learning

Analysis of learning activity (adopted by [SKATE project](#))

Learning activity title:		
Context:		
Time:		
Grade level:		
Main Objectives:		
How this activity is related with the lesson plan		
Brief Classroom Description (from lesson plan)	Number of Children Children that use personal AT Other details	
Procedure	(describe your activity in steps, incl. how you will differentiate by means of UDL and the implementation of ICT(-AT))	
Classroom organization (describe or draw your classroom)		
Materials/Technology:		
Who is involved or needs to be involved ? (e.g. parents, teacher, special needs educator, ..) + tasks	Who (name or profession) e.g. teacher	Task e.g. Set up the technology

How the activity responds to Differentiation & UDL Principles ?			
Tips			
Reflection on Activity implementation			
Date	Objectives	Evaluation	Suggestions

ANNEX 5: Example of an assistive technology implementation plan template

ASSISTIVE TECHNOLOGY IMPLEMENTATION PLAN



STUDENT INFORMATION		
Student name	Grade	Date of birth
School	Date	AT Plan Review Date
POINT OF CONTACT (Individual assigned to keep the implementation Plan updated)		

IMPLEMENTATION TEAM	
NAME (List all individuals involved)	ROLE (e.g. administrator, teacher, family, student, services provider)

EQUIPMENT	
EQUIPMENT & SOFTWARE TO BE USED	STATUS (e.g. owned by school, will purchase, borrow etc)

EQUIPMENT TASKS		
TASK (e.g. order/procure AT, customize, set-up, maintain, at school/home)	PERSON RESPONSIBLE	DATE DUE

TRAINING				
TRAINING NEED	TRAINEES	TRAINER	DATES & TIMES	FOLLOW-UP

CLASSROOM IMPLEMENTATION			
IEP GOAL	CURRICULUM DOMAIN	PERSON(S) RESPONSIBLE	AT NEEDED TO ACCOMPLISH GOAL

HOME IMPLEMENTATION			
IEP GOAL	CURRICULUM DOMAIN	PERSON(S) RESPONSIBLE	AT NEEDED TO ACCOMPLISH GOAL

MONITORING/EVALUATION			
GOAL	INSTRUCTIONAL STRATEGY	RECORDING SYSTEM & FREQUENCY (task analysis)	PERSON(S) RESPONSIBLE FOR IMPLEMENTATION/ DATA COLLECTION

Source: Bausch, M.E. & Jones-Ault, M. (2008). Assistive Technology Implementation Plan: A Tool for Improving Outcomes. *Teaching Exceptional Children*, 41(1), 6-14.

List of References and Resources

Articles and Readings

Abbott, Ch. (2007). *Report 5: E-inclusion: Learning Difficulties and Digital Technologies*. Bristol: Futurelab, 2007.

Anderson, L., & Krathwohl, A. (2000). Taxonomy of Teaching and Learning: A Revision of Bloom's Taxonomy of Educational Objectives. *Educational Psychology*, 479-480.

Bausch, M.E. & Jones-Ault, M. (2008). Assistive Technology Implementation Plan: A Tool for Improving Outcomes. *Teaching Exceptional Children*, 41(1), 6-14.

Booth, T. and Ainscow, M. (2011) *Index for Inclusion: Developing Learning and Participation in Schools*. Centre for Studies on Inclusive Education, Bristol.

Charalambous, Ch., Symeonidou, S., Philippou, S., & Agathaggelou, S. (2022) Differentiation Guidance for Teachers: What, Why and How? Ministry of Education, Sports and Youth, at: https://archeia.moec.gov.cy/mc/919/odigos_diaforopoiimenis_didaskalias.pdf

Cook, A.M., Polgar, J.M & Encarnação, P. (2020). *Assistive Technologies Assistive Technologies: Principles and Practice* (5th Edition). St. Louis: Elsevier

Dell, C.A, Dell, T.F. & Blackwell, T.L. (2015) Applying Universal Design for Learning in Online Courses: Pedagogical and Practical Considerations. *The Journal of Educators Online*, 12(5), 166-192

Devi, A., Gibbs, A., Gilbert, B., Henry, B., Lee, V., Mathis, D. & Williams, V. (2021). Critical Reflection and Communities of Practice as Professional Development Strategies for Educators. *International Journal for Cross-Disciplinary Subjects in Education (IJCDSE)*, 12(1), 4339 – 4349.

Dewey, J. (1933) *How We Think: a Restatement of the Relation of Reflective Thinking to the Educative Process*. Chicago: Henry Regnery.

Edyburn, D.L. (2002). Assistive technology and the IEP. *Special Education Technology Practice*, 4(3), 15-22

Engeström, Y. (2014). *Learning by expanding: An activity-theoretical approach to developmental research* (2nd ed.). Cambridge University Press.

European Agency for Special Needs and Inclusive Education, 2022. *Inclusive Digital Education*. (H. Weber, A. Elsner, D. Wolf, M. Rohs and M. Turner-Cmuchal, eds.). Odense, Denmark

Florian L., & Black-Hawkin K., (2011): Exploring inclusive pedagogy, *British Educational Research Journal*, 37(5), 813-828

Florian, L. (2015) Inclusive Pedagogy: A transformative approach to individual differences but can it help reduce educational inequalities?, *Scottish Educational Review* 47(1), 5-14

Galvez – Martin (2003). Reflective Teaching, Reflective Practice, and... What Else? *Florida Association of Teacher Educators Journal*, 1(3), 59-65.

Hoogerwerf, E.J. (2021). The development of competences in assistive technology. In E.J. Hoogerwerf, Mavrou, K. and Traina, I. (Eds.). *The Role of Assistive Technology in Fostering Inclusive Education. Strategies and Tools to Support Change*. (pp 108-131). London & New York: Routledge

- Hoogerwerf, E.J., Mavrou, K. and Traina, I. (Eds.) (2021). *The Role of Assistive Technology in Fostering Inclusive Education. Strategies and tools to support change*. London & New York: Routledge
- Kolb, D. A. (1984) *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice Hall.
- Korthagen, F. & A. Vasalos (2005) Levels in Reflection: Core Reflection as a Means to Enhance Professional Growth. *Teachers and Teaching: Theory and Practice*, 11(1), 47-71.
- Koutrouba, K., Voulgari, R. & Antonopoulou, E. (2020). Educational Reflection: Metacognitive Feedback in Teaching. *Education Sciences*, 1, 112-128 (in Greek)
- Lewis, A. & Norwich, B. (2005). *Special Teaching for Special Children? Pedagogies for Inclusion*. Berkshire: Open University Press.
- Mavrou, K. & Hoogerwerf, E.J. (2021). Defining objectives: a self-assessment tool for inclusive schools for improving the adoption and use of AT. In E.J. Hoogerwerf, Mavrou, K. and Traina, I. (Eds.). *The Role of Assistive Technology in Fostering Inclusive Education. Strategies and Tools to Support Change*. (pp 45-74). London & New York: Routledge
- Mavrou, K., Banes, D., Boland, S., Valoti, I., Cerè, S., Miesenberger, K., Desideri, L., Martins, M., & Hoogerwerf, E.J. (2022). ENTELIS+ Competence framework: Empowering Educators and Trainers to Bridge the Digital Divide. In: Petz, A., Hoogerwerf, E.-J., Mavrou, K. (eds.) *Assistive Technology, Accessibility and (e)Inclusion, ICCHP-AAATE 2022 Open Access Compendium Part 2*, Johannes Kepler University Linz, Austria, 187-195.
- Mavrou, K., Meletiou-Mavrotheris, M. & Charalambous, C. (2019). Augmenting Reading through technology: The Living Book Project. Paper presented at the 15th AAATE International Conference, 28-30 August 2019, University of Bologna, Italy.
- Oliver, M. (1986). Social policy and disability: some theoretical issues. *Disability, Handicap & Society*, 1(1), 5-17.
- Peery, A. (2017). A brief history of co-teaching. *Cult of Pedagogy*, 1-2. online at: <https://www.cultofpedagogy.com/wp-content/uploads/2017/02/Brief-History-of-Co-Teaching.pdf>
- Puentedura, R. (2010). SAMR and TPACK: Intro to Advanced Practice [Blog post], Retrieved from http://hippasus.com/resources/sweden2010/SAMR_TPACK_IntroToAdvancedPractice.pdf
- Rappolt-Schlichtmann, G. (2020). Distance learning: 6 UDL practices for online learning. Retrieved from: <https://www.understood.org/en/school-learning/for-educators/universal-design-for-learning/video-distance-learning-udl-best-practices>
- Rodgers, C. (2002) Defining reflection: Another look at John Dewey and reflective thinking. *Teachers College Record*, 4, 842-866
- Scherer, M.J. & Craddock, G. (2002). Matching person & technology (MPT) assessment process. *Technology & Disability*, 13(4):125-132
- Sebba, J. & Ainscow, M. (1996): International Developments in Inclusive Schooling: mapping the issues, *Cambridge Journal of Education*, 26(1), 5-18
- Shakespeare, T., & Watson, N. (2001). The social model of disability: an outdated ideology?. *Research in social science and disability*, 2, 9-28.
- Sousa, D., & Tomlinson, C. 2011. *Differentiation and the brain: How neuroscience supports the learner-friendly classroom*. Bloomington: Solution Tree Press.

Tomlinson, C. A. (1999). *The Differentiated Classroom: Responding to the Needs of All Learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A. (2000). *The Differentiated Classroom: Responding to the Needs of all Learners*. Alexandria: Association for Supervision and Curriculum Development.

Zabala, J. (1995). The SETT Framework: A Model for Selection and Use of Assistive Technology Tools and More. In D. Chambers (ed.) *Assistive Technology to Support Inclusive Education* (pp 17-36). Emerald Publishing Limited

Frameworks, Guidelines and Projects Reports

ATLEC: Assistive Technology Learning Through A Unified Curriculum Project and Frameworks, at: <https://atlec-project.eu/>

CAST, 2022. Universal Design for Learning (UDL), at: <https://udlguidelines.cast.org/>

DigCompEdu: Digital Competence Framework for Educators, at: https://joint-research-centre.ec.europa.eu/digcompedu_en

DigComp 2.2: The Digital Competence Framework for Citizens, at: <https://publications.jrc.ec.europa.eu/repository/handle/JRC128415>

Digital Education Action plan, European Education Area, at: <https://education.ec.europa.eu/focus-topics/digital-education/action-plan>

ENTELIS self-assessment tool for schools, at: https://www.entelis.net/wp-content/uploads/2020/12/entelis_self_assessment_framework_for_schools_version_1.0_-_2016.pdf

ENTELIS+ Competences Framework for Trainers, at: <https://entelisplus.entelis.net/wp-content/uploads/2022/01/D3.17-ENTELIS-Competency-framework.pdf>

[European Accessibility Act](#)

European Agency of Special and Inclusive Education, at <https://www.european-agency.org/>

Global Report on Assistive Technology, by WHO and UNICEF, at: <https://www.who.int/publications/i/item/9789240049451>

KPT Guidelines for Lifelong Learning in Assistive technology, at: https://www.at4inclusion.org/wp-content/uploads/2020/12/KPT-bookguidelines_ENG_11_557-2.pdf

SKATE stands for Skills & Knowledge on Assistive Technology in Early childhood inclusive education, Erasmus+ Project, at: <https://skateerasmus.be/>

SKATE Competence Framework, at <https://skateerasmus.be/competency-framework/>

[SKATE Guidelines 2022](#), at: https://skateerasmus.be/wp-content/uploads/2022/10/IO2_A1_SKATE_Guidelines_def.pdf

SAMR Framework, available at Puentetura blog (2010): <http://hippasus.com/blog/>

Open University (2020) Strategic study techniques: Be aware of your habits. Available at: <https://help.open.ac.uk/be-aware-of-your-habits> (Accessed: 09 March 2022).

Prevalence of coverage of assistive technology in the WHO European Region: a scoping review. Copenhagen: WHO Regional Office for Europe; 2021. Licence: CC BY-NC-SA 3.0 IGO.

UN Convention for the Rights of Persons with Disabilities (CRPD), at: <https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-persons-disabilities>

United Nations (UN) 2030 Agenda for Sustainable Development, at <https://sdgs.un.org/2030agenda>

UNICEF: Inclusive Education, at: <https://www.unicef.org/education/inclusive-education>

UNICEF (2022). Educator's Digital Competence Framework (EDC) at: <https://www.unicef.org/eca/media/24526/file/Educators'%20Digital%20Competence%20Framework.pdf>

UNICEF (2018). [Teacher Manual of School-Based and Classroom-Based Activities to Support All Learners](#) (by Hollenweger, J.)

UNESCO (2018). ICT Competence Framework for Teachers, at: <https://unesdoc.unesco.org/ark:/48223/pf0000265721>

UNICEF (2015a) [Assistive Technology for Children with Disabilities: Creating Opportunities for Education, Inclusion and Participation](#)

UNICEF (2015). Teachers Training Modules for Inclusive Education: Linking Theory to Practice (by Hollenweger, J.) at: https://www.unicef.org/eca/sites/unicef.org.eca/files/2019-03/ToT_Intro_Module.pdf



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