

# KNOWLEDGE PACK



## Assistive Technologies

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## ASSISTIVE TECHNOLOGIES

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## INDEX

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# Introduction

## What is a KP?

**Knowledge Packages (KPs) are short, pragmatic guides on individual topics within EdTech**, meant to provide sufficient knowledge and understanding so that non-technical stakeholders can make key planning, design, and procurement decisions for education.

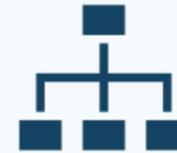
They can be used as a starting point for the planning of technology deployment to improve education, especially with education ministries.

## About this KP

This knowledge pack is designed to support the target audience with how to design and implement interventions with assistive technologies for education. The key objectives of this knowledge pack are to:

- Understand the existing evidence around assistive technologies in education
- Gain some practical know-how and resources specifically around procuring assistive technologies, designing accessible curriculum and implementing training
- Identify potential challenges and gaps in preparation for an intervention

**After reading the main content of this KP, some questions might pop\* :**





# Introduction

## DESIGNING FOR INCLUSION BENEFITS ALL LEARNERS

In addition to learners with disabilities, there are other vulnerable groups who should be prioritized and taken into consideration. When one or more vulnerable groups is centered and prioritized, it often has positive ripple effects in impact for other communities.



### Women and girls

Despite the rapid expansion of ICTs worldwide, women trail behind men in access and use of mobile phones, particularly in low and middle-income countries. Across Sub-Saharan Africa, women are 23% less likely to own a mobile phone than men, and the gap widens with regard to data and connectivity (UNESCO, 2014). This has serious implications for women and girls' literacy. Evidence has shown that the implementation of tech device enabled interventions at the beginning of primary education can prevent gender disparities driven by pedagogical practice (Pitchford, 2019).



### Rural communities

Concerning gaps in connectivity are growing for rural communities globally. In least developed countries (LDCs), 17 percent of the rural population live in areas with no mobile coverage at all, and 19 per cent of the rural population is covered by only a 2G network, whereas almost all urban areas of the world are covered by a mobile-broadband network (ITU, 2020). Moreover, the unaffordability of data, gender inequity and lack of digital skills play a role in hindering the participation of rural communities.



### Out of school, FCV settings and refugees

Technology is increasingly being utilized to provide educational opportunities to youth and their teachers in FCV, refugee and out of school contexts. Children in FCV countries face many challenges including (i) overcrowded classrooms, and (ii) under qualified, unqualified and or unpaid teachers (WB, 2020). Given these challenges, technology solutions such as providing devices to children for self-directed learning in such environments can be an important resource for children in such contexts who would otherwise not learn at all.

## WHO are the main stakeholders ?



### MAIN TARGET AUDIENCE

This knowledge pack is meant to provide sufficient knowledge and understanding to help World Bank staff (particularly, Task Team Leaders) and decision-makers to make key planning, design, and procurement decisions on Education Technology.



### STAKEHOLDERS IDENTIFIED TO LEAD THE CHANGE

Individuals and organizations to support the main target audience as they work with education ministries to design or implement education interventions with assistive technologies. These might be **community-based organizations** and **non-governmental organizations** with expertise in working with communities with disabilities, **start-ups and technology-based organizations** developing assistive technology products and **civil-society organizations** advocating for policies which support persons with disabilities.

As secondary stakeholders are those **policymakers** working in sectors such as finance, social protection, digital development, inclusion, among others depending on each country, as a whole of government approach is required for sustainable reforms.



## WHY is this KP designed ?

### PROBLEM STATEMENT

Close to 40% of children with disabilities are out of school in low and middle income countries ([GPE, 2018](#)). Less than 10% of children with a disability across Sub-Saharan Africa receive primary education ([Theirword, 2015; Global Education Monitoring Report 2020](#)). Like all students, students with disabilities are a diverse group with various needs, yet their needs are rarely addressed in the classroom. Students with disabilities often don't have access to the curricula, environment and teachers who can support them, and as a result either drop-out of school or never enroll. Assistive technologies are not an all-encompassing solution, but there are a number of challenges they can help address:

### INFRASTRUCTURE AND ACCESSIBILITY

Procuring the right devices and software for learners with different disabilities can increase their participation.

### DATA AND ASSESSMENT TOOLS

Assistive technologies can collect data on learners with disabilities, which has been a long-running challenge in education.

### ACCESSIBLE CONTENT

Accessible content produced in multiple formats supported by assistive technologies can make content available to learners with multiple disabilities.

### TEACHER AND LEARNER TRAINING

Assistive technologies and accessible content in tandem with effective training can support the successful adoption of assistive technologies by learners and teachers.

## WHY is this KP designed ?

### BENEFITS

#### BENEFITS OF INCLUDING ASSISTIVE TECHNOLOGY IN AN EDUCATION PROJECT

Assistive technologies can often be overlooked or deprioritized, yet there are benefits to centering them in an Education intervention.

##### SHORT TERM

- Manual wheelchairs and eyeglasses, for instance can increase access to education and employment and at the same time diminish healthcare costs ([WHO, 2018](#))
- In contexts where electricity and connectivity are accessible NVDA (screen reader) and other free open-source accessible technologies have made information and content more accessible to learners with disabilities in higher education ([Lyner-Cleophas M, 2019](#))
- Hearing aids used correctly by young children can result in greater language skills, and better long-term opportunities for education and employment (WHO, 2018)

##### LONG TERM

- Assistive technologies can reduce the costs and need for formal healthcare services and caregivers (WHO, 2016)
- Assistive technologies in tandem with a universal design approach and appropriate provision can support learners with disabilities in higher education ([Ndlovu, 2021](#))
- Assistive technologies can support persons with disabilities live independently and improve disability inclusion in the workforce (Trafford, 2021)

### BENEFITS

## WHAT are the potential solutions?

### STRUCTURE OF SOLUTIONS

#### WHAT DOES ASSISTIVE TECHNOLOGY COVER?

Assistive Technology: is an “umbrella term\* covering the systems and services related to the delivery of assistive products and services. Hearing aids, wheelchairs, communication aids, spectacles, prostheses, pill organizers and memory aids are all examples of assistive products. Globally, more than 1 billion people need one or more assistive products” (World Health Organization, 2018). “Assistive Technology broadly spells out a continuum of tools, strategies, and services that match a person’s needs, abilities and tasks, and includes evaluation of the needs of an individual with a disability (...).” ([Ahmad, 2015](#)). It is likely that different types of disabilities (vision impairment, hearing difficulties, intellectual disabilities, among others), will require different

EdTech solutions, but also different strategies and approaches (see [Annex](#) for some of the main types of assistive technology solutions). Clarity on this at the beginning of any strategy is crucial. Assistive technologies can include braille readers, AAC (alternative and augmentative communication) apps, screen magnifiers, text-to-speech and speech-to-text software, large-key keyboards, alternative input devices such as touchscreen displays; oversize trackballs on computer mice; and text readers.

It is important to note that a multi sectoral approach is ideally required for Assistive Technology as it requires strong coordination between education, health, rehabilitation, and social development sectors.

#### KEY WORDS

Disabilities

Inclusive education

Teaching aids

*Please note that the WHO definition of Assistive Technology includes a broad view on what constitutes technology, beyond digital solutions, as it encompasses for example mobility aids, such as wheelchairs, scooters, walkers, canes, crutches, prosthetic devices, and orthotic devices.*

## WHAT are the potential solutions?

### STRUCTURE OF SOLUTIONS

#### ASSISTIVE TECHNOLOGY AND INCLUSIVE EDUCATION

These are similar terms that are often used interchangeably, but there are some key differences.

##### ASSISTIVE TECHNOLOGY

Assistive technology refers to the devices and services that are used to increase, maintain, or improve the capabilities of a student with a disability (Dell, Newton, & Petroff, 2012).

##### INCLUSIVE EDUCATION

Inclusive education requires a profound cultural shift to attain one system of education for all learners at all levels of education—early childhood, primary, secondary, and post-secondary. This includes, but is not limited to, supports for learners with disabilities. In this transformation toward equity and inclusion, school systems must equip teachers, school leaders, and other staff with skills, knowledge, and resources to support the learning of all students in accessible environments. These changes also require attention to the unique context of each country and a whole-of-government approach. Building one system for all learners requires actions to ensure inclusion of ethnic minorities, indigenous people, persons with disabilities, sexual and gender minorities, and other marginalized groups ([World Bank 2021](#)).



## are the potential solutions?

### STRUCTURE OF SOLUTIONS

### THREE KEY FACTORS TO EVALUATE APPLICABILITY AND SUCCESS

Assistive technologies for education can be evaluated for applicability and success according to three key factors (Ahmad, 2015). Review the [WHO Priority Assistive Products List](#) for reference.

FACTOR	DESCRIPTION	SOLUTION EXAMPLE
<b>Inexpensive and easy to purchase</b>	Assistive technologies should be inexpensive to produce, purchase and maintain, and accessible locally.	Communication boards and cards.
<b>Suitable to learners and their environment</b>	Assistive technologies should be durable, compatible with learners customs and culture, physically comfortable, safe to use and reliable in the learner's physical environment (ex. remote or rural areas).	Accessible content such as local sign language videos.
<b>Easy-to-Use</b>	Assistive technologies should be portable, easy to operate (with limited technology experience) and without advanced skills or knowledge of technology.	Screen readers.

*While the confluence of these three factors is ideal, a flexible approach should be encouraged, as adjustments can be made based on local needs and constraints.*

## WHAT are the potential solutions?

### CHALLENGES AND TRADE-OFFS

#### MORE STUDIES NEED TO BE PUBLISHED ON THE USE OF ASSISTIVE TECHNOLOGIES IN LOW- AND MIDDLE-INCOME COUNTRIES

There is a need for more evidence and overall studies on assistive technologies for learning outcomes in low- and middle-income countries for a number of factors:

##### Geographic focus

Most evidence on assistive technologies is predominantly focused on developed countries in North America and Europe that have significant progress on inclusive education (Ahmad, 2015; WHO 2017).

##### Disabilities focus

Most evidence is focused disproportionately on deaf/hard-of-hearing and blind/low-vision learners, versus learners with learning difficulties or other disabilities (EdTech Hub, 2021).

##### Unaffordability

Assistive technologies are extremely difficult to obtain through public services, making them unaffordable. Two-thirds of respondents in a research study in Bangladesh did not have a hearing aid or wheelchair due to cost (IDS, 2018).

##### Underfunded maintenance

Follow up and maintenance is one of the most overlooked and underfunded aspects of assistive technology services but they are critical to the long term success of education interventions (GDI Hub, 2021).

##### Technology over pedagogy

There has been more of an investment in technology rather than curriculum goals or pedagogy, and as a result insufficient data on how technology can help teachers to support learners (EdTech Hub, 2021).

## WHAT are the potential solutions?

### CHALLENGES AND TRADE-OFFS

#### PROCUREMENT, ACCESSIBLE CONTENT AND TEACHER TRAINING

##### CHALLENGE

##### EVIDENCE

###### Procurement



- According to the WHO, approximately only 5-15 percent of people who require assistive technologies have access to them. Despite research pointing to its benefits for facilitating learning, access to technology by children with disabilities remains limited worldwide. AT financing from national budgets is strained and government-run health insurance programs either don't provide coverage for AT or provide very limited coverage for AT both in range of products and in amount of reimbursement. PEAT has an introduction on [AT and procurement](#).

###### Accessible content



- One of the greatest barriers for learners with disabilities is the lack of accessible content. For students with disabilities, appropriate learning materials in a language they can understand can mean the difference between access to the same education as their peers and early dropout. Textbooks and learning materials need to be available in many formats, like large print, sign language, audiobooks and braille to meet the needs of learners. See a Toolkit on digital accessibility [here](#) and free online course [here](#).

###### Teacher training



- Overall, there has been insufficient emphasis on how technology can support teachers dealing with learners with special needs. There can be a reluctance among teachers to actively adopt edtech solutions / interventions in their everyday teaching due to significant gaps in the amount of knowledge teachers have on even the most basic technology used in the classroom. This could be due to the lack of know-how in relation to the use of technology to respond to the specific learning and social needs of different learners (Edtech Hub, 2021).

## WHAT are the potential solutions?

### WHAT HAS BEEN DONE IN OTHER COUNTRIES

#### CASES STUDIES

REGION	LESSONS	CASE STUDY
 Cyprus, Eastern Europe	Assessment, accessibility to resources, funding and training emerge as key factors	<a href="#">Cyprus case</a> in the use of technology in inclusive and special education, as very recently developed and shaped in the last five years in its educational system.
 Regional, Asia	School leadership is critical to go from policy to practice	<a href="#">This series of vignettes of case studies</a> looks at inclusive education across China, Indonesia, the Philippines and Singapore. While these countries are vastly different, a few common trends in challenges around inclusive education include teacher preparation and segregated schooling systems.
 Kenya, Sub-Saharan Africa	A network and incentives are crucial	<a href="#">A study in two counties in Kenya</a> proposes how county governments can benefit from adopting a “network” approach that draws on incentives-based cooperation from all stakeholders in order to combat challenges like monitoring special education programs.

## WHAT are the potential solutions?

### WHAT HAS BEEN DONE IN OTHER COUNTRIES

#### SPOTLIGHT : LEARN MY WAY READER

##### Description

The “Learn My Way” reader is an accessible digital textbook prototype led by UNICEF based on UDL principles. The textbooks is build on Radium and EPUB software, and supports learners with specific learning needs as well as all learners with and without disabilities.

Children have several options when using the “Learn My Way” reader. They can customize the reading experience to their specific learning style, there is a synchronized voice-over and sign language videos, adjustable controls formatted to a touchscreen tablet, and interactive accessible activities (UNICEF, 2021).

UNICEF is currently piloting the “Learn My Way” reader in **Nicaragua, Uruguay, Paraguay, Rwanda, Kenya, and Uganda** through 2021. The aim of the pilots is to test and validate how to create quality accessible curriculum-based content with ministries of education and other stakeholders using, and to measure the learning outcomes for children with and without disabilities using them (UNICEF, 2021).

##### Strategies they used :

- Considered multiple presentations and layouts of content for various screen sizes, orientations and devices
- Supports multiple ways of learning (visual, auditory, kinesthetic and read-

writing) and how that is produced through imagery, text, activities

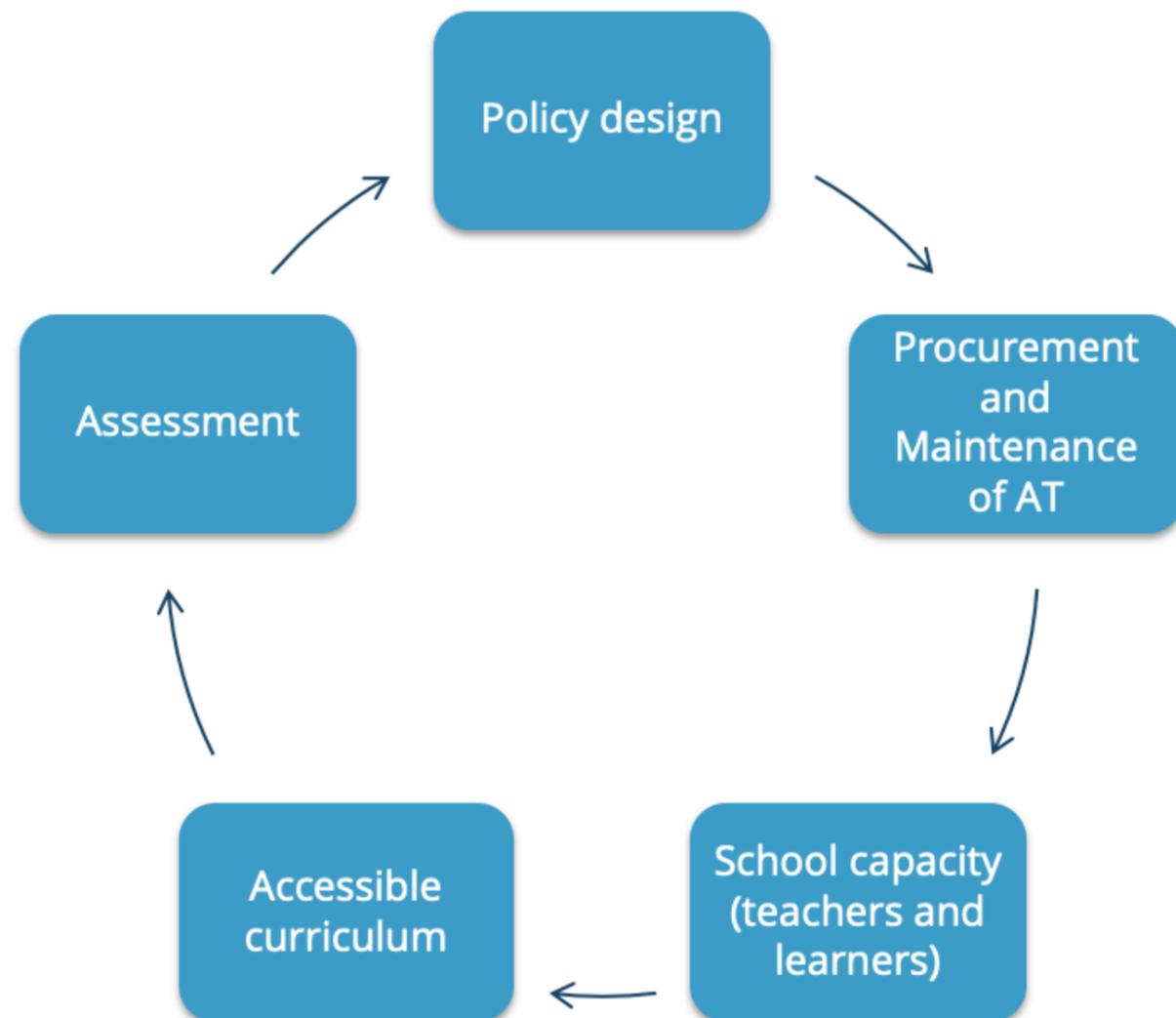
- Throughout the authoring process, thoughtful design decisions were made around the specialized use of fonts, images as mnemonic markers, etc. for specific learners



## HOW to implement next steps ?

### KEY INGREDIENTS FOR A SUCCESSFUL AT INTERVENTION

The use of technology for personalized and adaptive learning requires a series of enablers to use and adapt this alternative pedagogy in the classroom.



For more information on data collection systems that facilitate refining any EdTech innovation, refer to :



You can also review Technical Guide for Including Disability in education Management Information Systems (UNICEF, 2016) by clicking here :

## HOW to implement next steps ?

### PROCUREMENT AND MAINTENANCE

#### DEPLOYMENT



#### WHO DO YOU NEED ON YOUR TEAM?

- Procurement experts
- Assistive Tech Specialists
- Inclusive Education experts
- Policy experts



#### RESOURCES FOR PROCUREMENT

For additional information on AT products visit:

- [WHO Assistive product specifications and how to use them](#)
- [UNICEF Supply Division Supply Catalogue with over 2,000 Products](#)



Procurement KP

#### DEPLOYMENT PLANNING

- #1:** Research and select appropriate and affordable devices and software for learners.
- #2:** Design and plan for technical assistance on how to operationalize selected devices and software.
- #3:** Make modifications or customizations of the assistive technologies selected based on feedback from learners.
- #4:** Align assistive technologies with both the instructional and curriculum goals as well as the learners' individual needs.
- #5:** Plan for maintenance, repair and long-term costs and support around assistive technologies. It is estimated that 80% of the total Cost of Ownership is associated with the deployment and support of a device.



## to implement next steps ?

### PROCUREMENT AND MAINTENANCE

#### IMPLEMENTATION STEPS

STEP	DESCRIPTION	RESSOURCE
#1: Create a national assistive tech list.	Work with government partners to develop a national assistive product list (APL) for inclusive education with technical specifications and standards in order to guide procurement and/or reimbursement package policies. Support ministries to create national EPLs (Education Product Lists) that cover the products needed to ensure inclusive education.	Take a look through the <a href="#">WHO's assistive product specifications</a> list for ideas and recommendations.
#2: Map and quantify the need for assistive technologies.	Survey the population of children via stratified sampling to represent all geographies, to determine the prevalence of needs for physical and learning-related support. Disability disaggregated data is crucial to inform better policies. (Prevalence = the number found divided by the total sample size, multiplied by 100.	Review the <a href="#">WHO Model Disability Survey</a> prior to adapting it to your needs (and to assess the child population).
#3: Specify policy and program requirements.	Prepare sections of policy and of program documents that specify requirements for: 1) schools and classrooms; 2) books and other materials; 3) Digital tools and digital resources. Early on, specifications can be top-level and general, describing functionality rather than configuration. (An example is requiring books to be formatted for low-vision readers without specifying typeface or typesize, contrast or other details.)	Learn about <a href="#">WHO's International Classification of Functioning, Disability &amp; Health (ICF)</a> .

## HOW to implement next steps ?

### PROCUREMENT AND MAINTENANCE

#### TRAPS TO AVOID

##### **FAILING TO TRACK DATA ON AT PROVISION**

Many countries fail to track reliable, accurate and population-based data that could help to estimate the need for AT nationally. This includes data on the prevalence of health conditions that may lead to an individual requiring AT and the prevalence of functional limitations that require AT (e.g., mobility, hearing, vision impairment) (CHAI, 2020).

##### **PROCURING AT THAT PRIORITIZES ONE DISABILITY LABEL**

Assistive technology procurement should not prioritize one disability category over others. The provision of assistive technology should aim to address learning gaps and expand technology access in order to strengthen the overall education system.

##### **NO NATIONAL STRATEGY**

Without a national strategy or roadmap with the goal of increasing access to AT, procurement usually happens in an ad-hoc manner with inconsistency in frequency, and is not driven by detailed product specifications or based on forecasted demand (CHAI, 2020).

##### **LACK OF REGULATORY STRUCTURES FOR AT**

When there are no regulatory structures, guidelines and standards to inform and regulate the procurement of assistive products, this can lead to issues in the quality of the products and their appropriateness for the context and needs of the users (CHAI, 2020).

Traps to avoid along the way



## to implement next steps ?

### ACCESSIBLE CURRICULUM

#### DEPLOYMENT



#### WHO DO YOU NEED ON YOUR TEAM?

- Curriculum designers
- Assistive Tech Specialists
- Policymakers
- Learning designers



#### COSTS

#### UDL and Accessible Content Can Lower Costs

Research has shown that initiatives which provide reading materials in accessible formats such as Bookshare and Pratham Storyweaver could bring about cost savings in the supply chain when compared to providing alternative formats for print books (example: Braille translation) (Banes et. al, 2020). A digital reading program designed to resemble a traditional library model is about **12-13 times more costly** than implementing a structured reading program which

takes a universal and inclusive design approach, in which every child reads the same book ([Banes et. al, 2020](#)).

#### Consider this to Cut Costs:

Incorporating accessible digital content into wider digital learning initiatives

- Freely licensed or open-source content embedded
- Commonplace and affordable devices to access learning materials

#### DEPLOYMENT PLANNING

**#1:** Profile individual learners to determine their assistive technology requirement.

**#2:** Work with curriculum specialists and accessible multimedia designers to take a universal design approach and produce content in multiple formats.

**#3:** Design accessible assessments to accompany accessible content for learners.

**#4:** Design and plan teacher training on how to use and create accessible content in tandem with assistive technologies.

## HOW to implement next steps ?

### ACCESSIBLE CURRICULUM

### IMPLEMENTATION STEPS



STEP	DESCRIPTION	RESSOURCE
<p><b>#1: Review existing content policies.</b></p>	<p>To support a clear vision for accessible content, review and develop explicit policies that address the importance of accessibility in planning for the increased use of digital content, with recognition of UDL principles. It's also critical to co-design this content with target users vs. only proxies (ex. parents and teachers).</p>	<p>Check out Benetech's <a href="#">Born Accessible resources</a> for content creators and publishers.</p>
<p><b>#2: Create clear accessible content guidelines.</b></p>	<p>Evaluate if learners with disabilities have access to the current curriculum designs. If not, consider whether a re-design of the national curriculum aligned to the three UDL principles could be a pathway forward for greater access and inclusion. Establish a clear vision and use for accessible content to content creators (publishers, vendors, educators), content-users (educators, learners) and other relevant stakeholders in order to support the development of accessible content and a coordinated understanding of the requirements for accessible content.</p>	<p>USAID's <a href="#">Universal Design for Learning to Help All Children Read toolkit</a> features helpful content guidelines.</p>
<p><b>#3: Support educators with accessible content.</b></p>	<p>Provide educators with access to quality accessible digital content (whether OER or commercial) repositories, and opportunities to learn how to mobilize these materials in the classroom. Educators can also be supported with professional development on how to mobilize this content in the classroom and create their own original accessible content.</p>	<p><a href="#">Bookshare</a> develops and maintains accessible content and materials</p>



## to implement next steps ?

### ACCESSIBLE CURRICULUM

#### TRAPS TO AVOID

##### **MODIFYING CONTENT VS. STARTING WITH BORN ACCESSIBLE**

Modifying content for learners with disabilities after the fact can be costly and challenging. It's important to consider these needs at the very start of the content authoring process rather than working backwards to save costs, ensure content is available to children with disabilities at the same time and create new norms around content creation.

##### **FAIL TO TAKE A UNIVERSAL DESIGN APPROACH**

Assistive technology procurement should not prioritize one disability category over others. The provision of assistive technology should aim to address learning gaps and expand technology access in order to strengthen the overall education system.

##### **FORGET TO CONSIDER LAWS AND REGULATIONS**

Without a national strategy or roadmap with the goal of increasing access to AT, procurement usually happens in an ad-hoc manner with inconsistency in frequency, and is not driven by detailed product specifications or based on forecasted demand (CHAI, 2020).

##### **DISREGARD FUNDING FOR ACCESSIBLE CONTENT**

When there are no regulatory structures, guidelines and standards to inform and regulate the procurement of assistive products, this can lead to issues in the quality of the products and their appropriateness for the context and needs of the users (CHAI, 2020).

Traps to avoid along the way



## to implement next steps ?

### AT TRAINING

### DEPLOYMENT



#### TRAINING EXAMPLES

Take a look at [a series of open-source training materials for AAC interventions](#) developed by Global Symbols in partnership with UNICEF. The training materials cover:

- [Fundamental of AAC](#)

- AAC Systems and Devices
- Symbol Set Choices
- AAC Assessment
- AAC activities in a classroom
- Low tech access
- Integration of other tech solutions
- Evaluating success



#### COSTS TO CONSIDER

When training is not thought of holistically, many essential elements can get lost and unexpectedly drive up costs. Critical factors to consider in the planning stages for training include:

- Shipping of devices (including import tariffs)
- Training facilities, accommodation/transportation and daily stipend for

- participants
- Translation of training resources
- Open licensing for training materials so that they can be shared and built upon
- Basic digital literacy training for participants
- Technology standards used across different regions, which may need to be considered during training and for training materials



#### WHO DO YOU NEED ON YOUR TEAM?

- Inclusive education and disabilities inclusion experts
- Assistive Tech
- Specialists
- Learning designers
- Multimedia designers

#### DEPLOYMENT PLANNING

**#1:** Assess needs and design training for learners with disabilities on how to use AT. Engage parents/ caregivers to support their child's use of AT for education.

**#2:** Design teacher training on how to use AT with diverse learners.

**#3:** Consider Offering therapies and services related to the use of assistive technologies.

**#4:** Building teachers' capacity to consider how AT will support the functional skills that allow students to access the general curriculum.

## HOW to implement next steps ?

### AT TRAINING

#### IMPLEMENTATION STEPS

STEP	DESCRIPTION	RESOURCE
#1: Gather data on learner needs for UDL.	Conduct research and gather data on student needs, abilities and skill levels in order to personalize instruction. Consider how you might collect this data per classroom, school, or district. This data can support with UDL (universal design for learning) interventions, an evidence-based framework based on inclusive design principles in curriculum development to meet the needs of all students (CAST, 2018).	Learn more about Universal Design for Learning through <a href="#">CAST</a> . Access <a href="#">USAID's Using ICT to Implement UDL</a> guideline.
#2: Design an MTSS model.	MTSS is a popular model for operationalizing the principles of UDL with technology. This three-tiered system (whole class, small group, one-to-one) demonstrates how to raise the intensity of instruction in any arrangement (i.e., whole class, small group, and/or individualized instruction), in order to meet the needs of students with widely varying abilities. Leverage the data you have on student needs and the MTSS model to determine which students are best served by certain segments of the curriculum (tier 1/tier 2/tier 3).	Read more about MTSS in action on <a href="#">Edutopia</a> .
#3: Design teacher training.	Make teacher professional development a priority, and design opportunities for teachers to apply their skills using AT in the classroom. Teacher professional development programmes which incorporate digital literacy training are incredibly important when there is a need to apply more complex assistive technologies in the classroom to provide increased and high-quality learning experiences for learners with disabilities across different contexts (Lynch, 2021).	Check out this <a href="#">repository of PD resources</a> from the Center on Technology and Disability.

## HOW to implement next steps ?

### AT TRAINING

#### TRAPS TO AVOID

##### TAKE A ONE-SIZE-FITS ALL APPROACH

Not all technologies are applicable for all students with the same disability type. Determining a student's accessibility needs should target the learning needs of the student. It's also critical to consider students motivations, strengths and challenges. Individualized education plans (IEPs) often capture this student data (Banes et. al., 2020).

##### DISCARD ANALOG TOOLS AND OPTIONS

Technology is a natural medium for UDL, but the needs of learners may not always be met with tech-based solutions. In addition to having content available in flexible digital formats, it's also critical to provide learners with access to more tactile modalities.

##### IGNORE INTERSECTING VARIABLES

Engaging learners through UDL, MTSS and providing them with access to audio, video, digital text, and other accessible formats should not only apply to content but assessments as well. It's key to provide learners with options for how they are asked to demonstrate their knowledge and assessed against it.

##### TRADITIONAL ASSESSMENTS

Some studies have shown that for teachers to successfully gain confidence in using new AT with diverse learners in the classroom, they need more hands-on and practical opportunities to apply new skills through teacher PD (Lynch, 2021).

##### LACK OF EFFECTIVE TEACHER TRAINING

There are intersecting variables such as gender, socio-economic status and location (rural / urban) which are important to consider, and can have a critical impact when implementing new ed tech interventions in LMICs (EdTech Hub, 2021).

Traps to avoid along the way

## HOW to implement next steps ?

### MONITORING AND EVALUATION

A 2021 systematic review conducted by the EdTech Hub demonstrated that there is a **lack of evaluation data of educational interventions which met the Inclusion criteria for the review.**

A 2021 landscape survey conducted across 5 countries by the IEI and GDI Hub corroborates this evidence, and determined that **assessment and evaluation emerged both as a key challenges and crucial enablers to the success of EdTech in improving the learning of children with disabilities at primary school level.**

#### Psychosocial Impact of Assistive Devices Scale (PIADS)

One promising tool that has been developed to assess the impact of assistive devices on functional independence, well-being, and quality of life is the PIADS, a 26 question instrument for self-reporting (Jutai, 2002). The PIADS was created to address the need

for a reliable, valid, and economical measure that is generically applicable across all major categories of assistive technology (Jutai, 2002). The PIADS has been used by [UNICEF and Global Symbols](#) in Croatia, Montenegro and Serbia for young children with complex communication needs who otherwise may be left out of early childhood education services (UNICEF, 2020).

#### Some of the challenges around monitoring and evaluation include:

1. Teachers lack of sufficient competences to conduct extensive assessments and the absence of support from specialized professionals like speech therapists (GDI Hub, 2021).
2. For cognitive and learning difficulties and other impairments, there is no consensus on codified procedures for the assessment of learners needs, or guidance on how to support students or indication of what types

of assistive technologies might be most beneficial (GDI Hub, 2021).

3. Government and non-government run initiatives are not always properly evaluated, as they rely on informal and unstructured feedback collected from teachers, families or learners, which can produce data with bias and difficult to compare (GDI Hub, 2021).



## Conclusion

### WHERE TO START ? RECOMMENDATIONS

1. Review the implementation slides to start building a work plan.
2. Assess how many learners with disabilities can benefit within your context by prioritizing assistive technologies.
3. Ministries can underestimate the number of learners with disabilities who are out of school or receive a poor quality education, especially when data on disability is not tracked. Collect and synthesize data that you can share.
4. Create buy-in and build a case to invest in assistive technologies for education.

### CALL TO ACTION

- Assistive technologies are not an add-on, they are essential and must be a priority to achieve SDG4: **'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all'**.
- **The WBG has committed to ensure that all financed education projects and programs will be disability-inclusive by 2025.** See [Guidance Note of the Criteria for the World Bank's Disability-Inclusive Investment Project Financing \(IPF\) in Education.](#)



## Conclusion

### WHO

World Bank staff (particularly, Task Team Leaders) and decision-makers beyond the World Bank who support education ministries on education technology.

### WHAT

Assistive technologies specifically for education can include braille readers, AAC (alternative and augmentative communication) apps, screen magnifiers, text-to-speech and speech-to-text software, large-key keyboards, alternative input devices such as touchscreen displays; oversize trackballs on computer mice; and text readers.

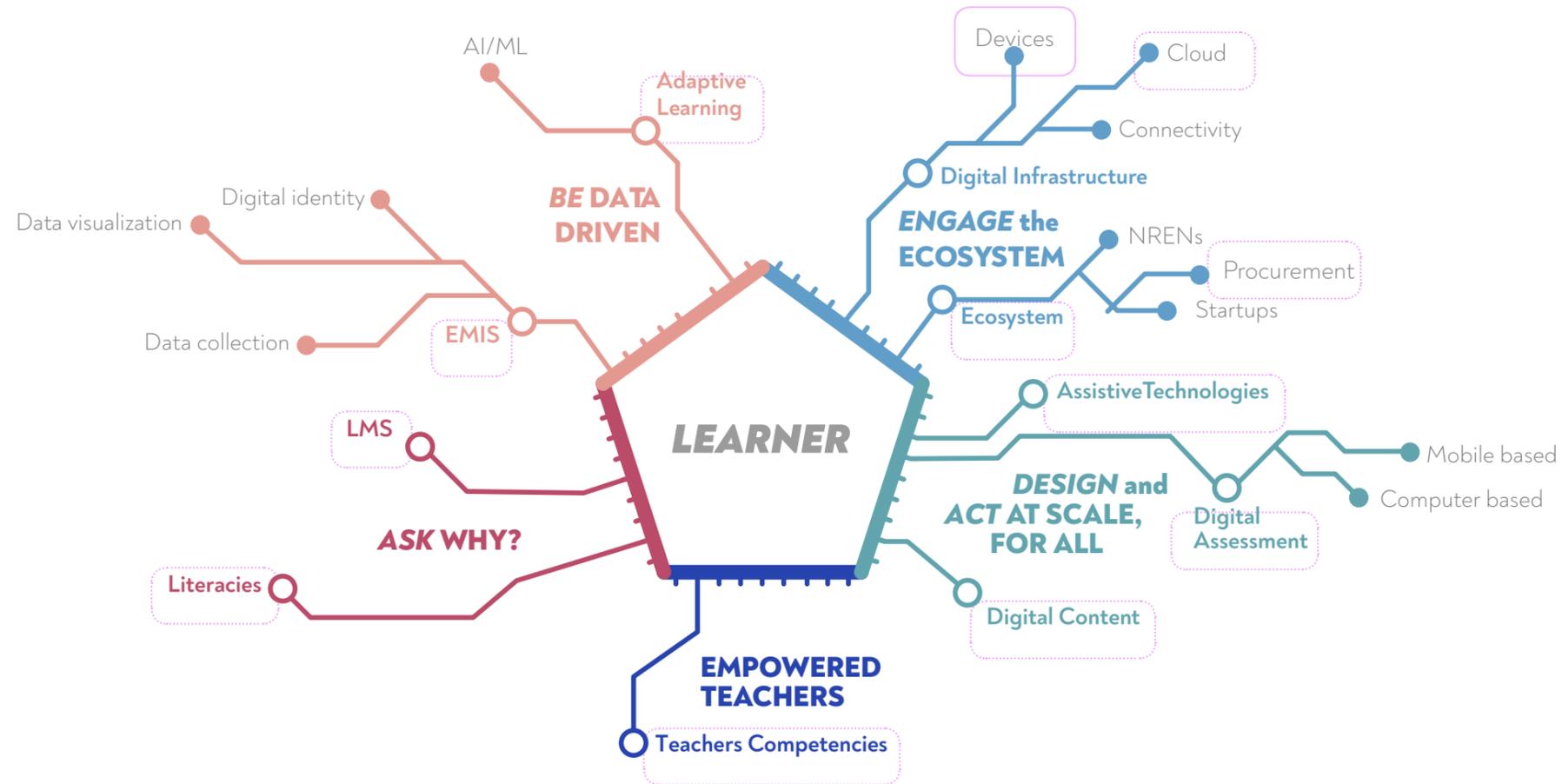
### WHY

Students with disabilities often don't have access to the curricula, environment and teachers who can support them, and as a result either drop-out of school or never enroll. Assistive technologies are not an all-encompassing solution, but can address a number of these challenges.

### HOW

The key ingredients for a successful assistive technology intervention include the prioritization of procurement and maintenance, accessible curriculum and content, and training for students, teachers and caregivers.

**To go further**  
**CLOUD OF KPs**



**OTHER EXISTING RELATED KPs**



EMIS 2.0



Digital content



Devices



Procurement

**RELATED SOURCES**



[GLAD infographic on Inclusive Education](#)

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## Annexes

### GLOSSARY

<b>ADDIE</b>	Analysis, Design, Development, Implementation and Evaluation
<b>ADL</b>	Active Daily Living
<b>AIM</b>	Accessible Instructional Materials
<b>AT</b>	Assistive Technologies
<b>AT ICT</b>	Assistive Products for Communication and Information
<b>CLASP</b>	Consolidating Logistics for Assistive Technology Supply and Provision
<b>HAAT</b>	Human Activity Assistance Technology
<b>HI</b>	Hearing Impairment
<b>IDEA</b>	Individuals with Disabilities Education Act
<b>IEP</b>	Individualized Education Plan
<b>ISP</b>	Individualized Service Plan
<b>IT</b>	Information Technology
<b>LD</b>	Learning Disabilities

<b>NIMAS</b>	National Instructional Materials Accessibility Standard
<b>OAT</b>	Open Source Assistive Technology
<b>PWD</b>	Persons with Disability
<b>SEC</b>	Special Education Classroom
<b>SEND</b>	Special Educational Needs and Disabilities
<b>SEN</b>	Special Educational Needs
<b>SETT</b>	Student, Environment, Task, and Tools
<b>SNE</b>	Special Needs Education
<b>UDL</b>	Universal Design for Learning
<b>VI</b>	Visual Impairment
<b>YAACK</b>	Augmentative and Alternative Communication Connecting Young Kids
<b>LRE</b>	Least Restrictive Environment
<b>NCLB</b>	No Child Left Behind

## Annexes

### DEFINITION OF KEY TERMS AND RELATED RESOURCES

**Inclusive Education** The World Bank approach to Inclusive education (IE) builds on the approach promoted by the UNESCO Salamanca Statement and Framework for Action (1994); the UN Convention on the Rights of Persons with Disabilities (UNCRPD), in particular Article 24, which focuses on the inclusion of children with disabilities in mainstream education, as well as UN Sustainable Development Goal 4. There are a number of resources outlining the Bank's approach to inclusive education, specifically the Inclusive Education Resource Guide: Ensuring Inclusion and Equity in Education (2019), which provides technical guidance across all stages of project planning, as well as education sector-specific guidance related to disability and sexual and gender minorities. [Guidance Note for the Criteria for the World Bank's Disability-Inclusive Investment Project Financing in Education \(2021\)](#) supports WB teams in meeting the target for ensuring

all World Bank education IPF operations are disability inclusive by 2025 and should be used in conjunction with the Inclusive Education Resource Guide.

**Assistive technology (AT)** is defined by the WHO as: "...the application of organized knowledge and skills related to assistive products, including systems and services"

**Assistive products (AP)** are defined by the WHO as "...any external product (including devices, equipment, instruments or software)...the primary purpose of which is to maintain or improve an individual's functioning and independence, and thereby promote their well-being".

**Universal Design for Learning (UDL)** is an approach to education research, design and practices which uses the following three core principles (CAST 2021):

- providing multiple means of engagement
- providing students with multiple means of representation;
- providing multiple means of action and expression;

#### **Accessible information and communication technologies (ICT) for persons with disabilities**

including hardware such as magnification devices, e-book readers for persons with disabilities; software such as screen readers; mobile applications to enhance functional access to content and communication including voice recognition, magnification, object recognition, apps for alternative and augmentative communication.

# Annexes

## FAQ



## Annexes

### FAQ

#### What are the main types of assistive technology solutions? (Part 1/2)

CATEGORY	AT APPLICATION	NEED AND RELEVANCE
Reading	Electronic books, Book adapted for page turning, Single word scanners, Predictable texts, Tabs, Talking electronic devices/software, Speech Software	For students having difficulty in reading and understanding written text and in paying attention to the reading assigned.
Writing	Pen/Pencil grips, Templates, Word processors, Word card/book/wall, software, Spelling/Grammar checker, Adapted papers	For students having problem in writing or composition
Math	Calculators, Talking Clocks, Enlarged Worksheets, Voice Output Measuring Devices, Scientific Calculators	For students having computational problems and confusions, and finding it difficult to perform well in Math lessons
Vision	Eye glasses, Magnifier, Screen Magnification, Screen Reader, Braille Large Print Books, CCTV, Audio Lesson Tapes	For students who have difficulty in seeing or lack complete vision
Hearing	Hearing Aids, Pen and paper, Signaling Devices, Closed Captioning	For students who have difficulty in hearing or are absolute hearing impaired

## Annexes

### FAQ

#### What are the main types of assistive technology solutions? (Part 2/2)

CATEGORY	AT APPLICATION	NEED AND RELEVANCE
Computer Acces	Word prediction, Alternative Keyboards, Pointing Option, Switches, Voice recognition software	For students finding it difficult to access the computer in its standard form and have difficulty in performing academic tasks
AAC	Communication Board, Device with speech synthesis for typing, Eye gaze board/ frame, Voice output device	For students having problems in comprehension of language, and lacking the ability to express it, or are unclear in speech and demonstrate delayed expressive language
Learning Disability and ADD	Use of applications/devices depending upon the degree of disability/difficulty, in the area of reading and writing (Dyslexia), hand-eye coordination, written expression and composition (Dysgraphia), difficulty in fine motor skills, Coordination (Dyspraxia), Math (Dyscalculia) and Attention (ADHD) like - Talking electronic devices, Calculators, Electric Organizers, Highlighters, Pencil Grips, Post-its, Computers, Spelling/Grammar Checker, Electronic Organizers, Recorded materials, Hand held Scanners, Print or picture schedule, Electronic Diaries etc.	For Students having problem in language development, reading and writing (Dyslexia), hand-eye coordination, written expression and composition (Dysgraphia), difficulty in fine motor skills, Coordination (Dyspraxia), Math (Dyscalculia), and ADHD.

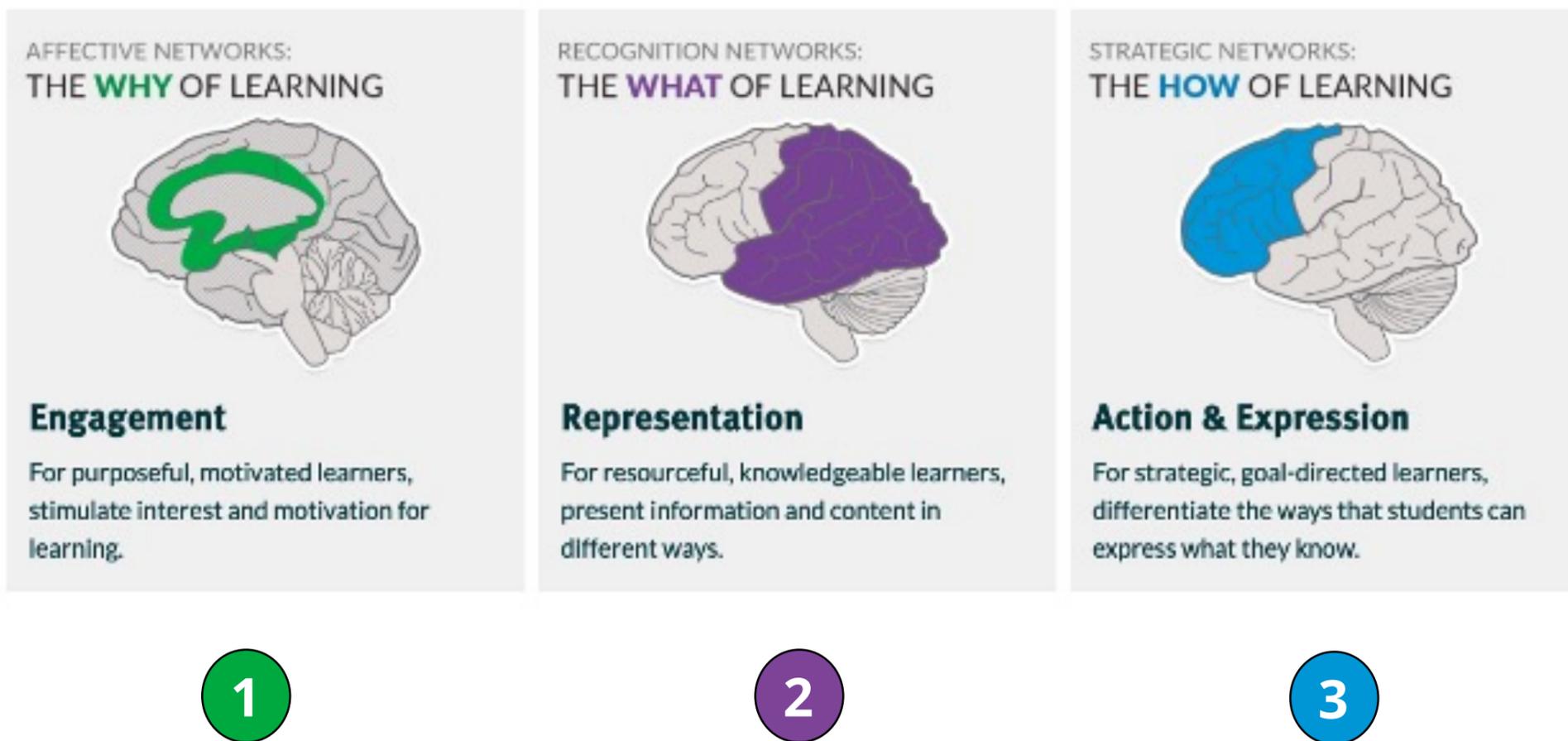
## Annexes

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What are some pedagogical strategies that can support AT?

### Universal Design for learning



1) Ask learners about their needs, strengths, and interests in order to design engaging lessons.

2) Leverage technology so that learners can easily adjust fonts, sizes, colors, and provide options such as text-to-speech and other accessibility features.

3) - Provide various formats for learners to demonstrate their knowledge.  
- Make commonplace AT accessible to learners.  
- Support learners keep track of subtasks for meeting learning goals (calendars, checklists, etc.).

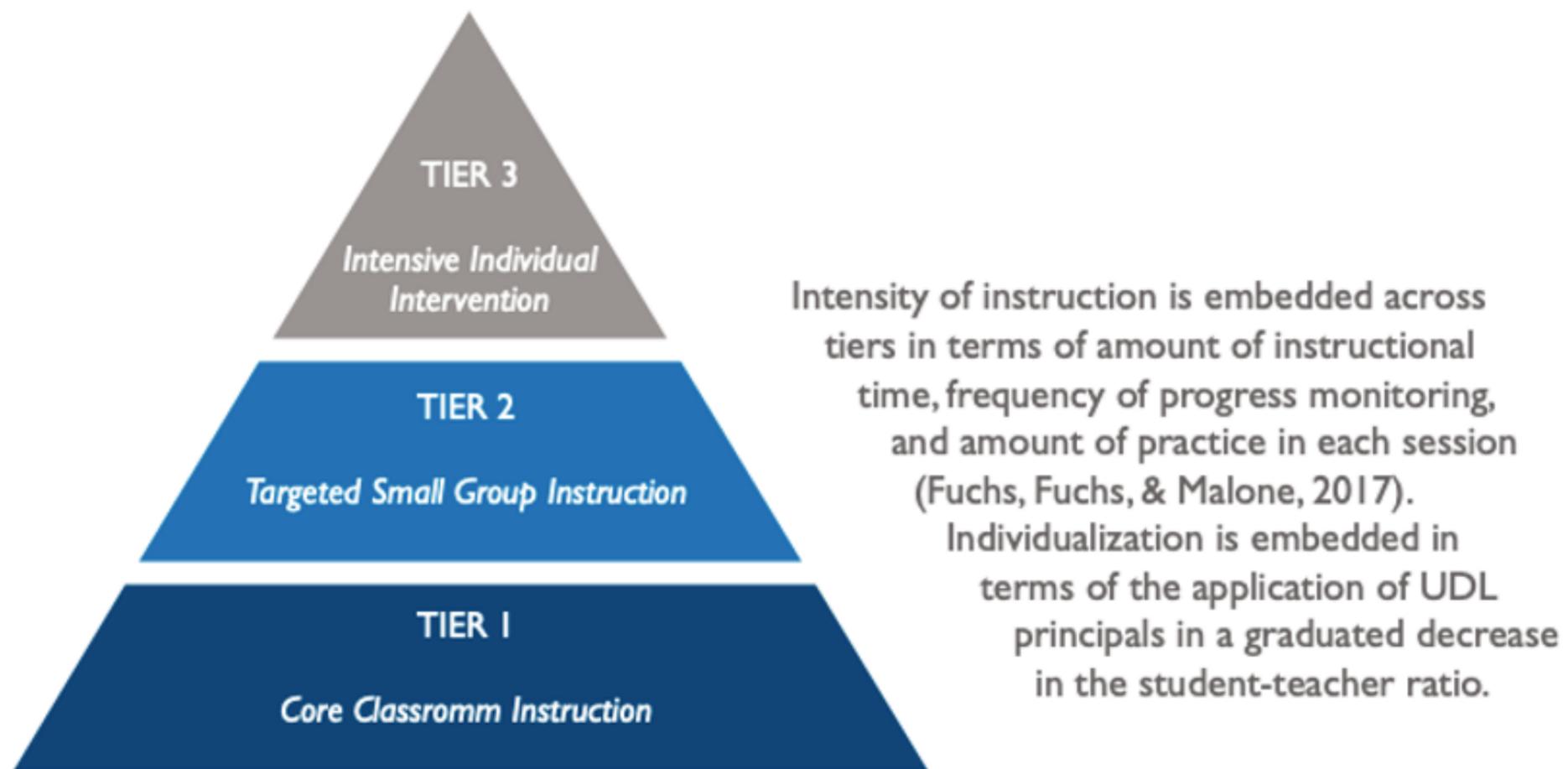
## Annexes

### FAQ



**What are some pedagogical strategy that can support AT?**

### MTSS (Multi-Tiered System of Support)



MTSS can be useful in operationalizing the three principles of UDL.

Based on their students' learning needs, teachers can analyze which modalities of student engagement, content representation, and student expression/action are most effective and appropriate for each of the three tiers.

This analysis can help them improve the quality of teaching for their students with disabilities, and in turn all of their students.

## Annexes

### FAQ



### What are some pedagogical strategy that can support AT?

#### Accessible Content Types (USAID)

<b>Blind / low vision</b>	Text in braille, large print, or both to understand spelling, grammar, and how text is formatted. Most students will learn to write in braille too. They need an assistive device like a slate and stylus, braille, or other technology to do this. Audiobooks, tactile pictures, and manipulatives help reinforce literacy skills.
<b>Communication challenges</b>	Materials should be available for students to use depending on their preferences and capabilities. This includes high-tech augmentative and alternative communication tools like tablet-based apps or low-tech formats like image printouts.
<b>Deaf / hard of hearing</b>	Provide access to a wide range of writing tools and adapted books. Adapted reading materials with a decreased reading level and simplified grammar let students learn with their peers. Digital texts let students add extra spaces, enlarge text, or have it read aloud as needed. Graphics, pictures, and video enhance comprehension. Physical manipulation to understand vocabulary and content.
<b>Intellectual disabilities</b>	Provide access to a wide range of writing tools and adapted books. Adapted reading materials with a decreased reading level and simplified grammar let students learn with their peers. Digital texts let students add extra spaces, enlarge text, or have it read aloud as needed. Graphics, pictures, and video enhance comprehension. Physical manipulation to understand vocabulary and content.
<b>Learning, emotional, and attention disabilities</b>	Students need many ways to communicate what they learn. This includes manipulatives, like letter blocks or cards and interactive games. They should have access to a wide range of texts chosen by both the teacher and student.
<b>Multiple disabilities or deafblind</b>	These students can achieve braille and/or print literacy. However, they need help with the building blocks of learning the skills.

## Annexes

### FAQ



#### Where can I find additional case studies?

### Using the Global Burden of Disease database

Researchers at WHO and WHO EURO collaborated to assess the capacity of governments in four countries to provide assistive products (AP) to people who needed them.

**Methodology:** The method involved using the [Global Burden of Disease](#) database to estimate the prevalence of mobility, hearing and visual impairments in Armenia, Denmark, Spain and Ukraine. These estimates were followed by qualitative investigation of governments' abilities to procure and provide the needed assistive products.

**Results:** The use of the database revealed 50 to 90 % higher prevalences of presbyopia, hearing impairment, amputation and other issues in Armenia and Ukraine than in Spain and Denmark. However all four countries were able to provide the 15 highest-priority assistive products. However, all four countries also demonstrated challenges in their regulatory environments, especially in relation to requirements of private-sector products and tools

#### Strategies they used:

- Search the Global Burden of Disease using country and other filters.

- Mail capacity assessment of: efficacy of provision; cost; regulation; distribution and other factors to government and/or donor respondents.
- Conduct in-person and phone meetings to follow-up on the assessment.

NOTE that the database can be filtered by age, including “under 15,” as well as other factors.

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#### Where can I find additional case studies?

### Global Symbols

Global Symbols is a free and open-source publishing platform created especially for symbol sets for learners with speech and communication impairments. Global Symbols links freely available AAC symbol sets with other linguistically and culturally localised symbol sets, providing AAC users with global access to appropriate pictographic based communication that can be used on any communication application.

Global Symbols carries over a dozen AAC symbol sets that are culturally and linguistically diverse for AAC users.

AAC users can also personalize an AAC symbol set with the Board Builder, which supports them create their own AAC layouts and templates, search and select the images they want, and add their own photos.

Global Symbols has also developed a series of training packages for speech and language therapists and others on how to use symbol sets when working with young children who are non-vocal or have speech, language and literacy difficulties. This work has been piloted with UNICEF in Croatia, Montenegro and Serbia.

#### Strategies they used:

- Linked symbol sets from various geographies and cultures to create interoperability and greater access to communication platforms for AAC users
- Developed tools for AAC users to personalize their symbols sets
- Created a set of trainings to support professionals and non-professionals understand how to use symbol sets in interventions with AAC users

## Annexes

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## What are some other common assistive technology challenges and more resources to address them?

### Challenges

#### Poor policies and budgets

Policies, and targets in many countries are not inclusive of children with disabilities, and countries lack appropriate budgets and resources for AT programming. The lack of accurate data, operating guidelines for screening and assessment and service delivery models affects effective AT use and the success for the learners.

#### Inadequate assessment

To determine the needs of the learners in order to get appropriate devices to enable learners with disability to perform tasks and assignments that they would not typically be able to do without the necessary supports to be successful in the general education in the classroom.

#### Cultural Barriers

Cultural beliefs can act as a huge barrier to the use of assistive technologies. The negative attitudes towards children with disabilities held by caregivers, teachers and members of a community can mean that stigma and discrimination prevent learners with disabilities from receiving the assistive technology the need or affect their self-esteem an academic work.

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**What are some other common assistive technology challenges and more resources to address them?**

### Ressources

#### GLAD Network

The Global Action on Disability (GLAD) Network is a coordination body of bilateral and multilateral donors and agencies, the private sector and foundations working to enhance the inclusion of persons with disabilities in international development and humanitarian action. [link](#) [GLAD Inclusive Education Infographic](#)

#### Digital assistive technology innovation

This GSMA report reviews the current state of innovation in digital assistive technologies in low- and middle-income countries (LMICs) and the perspectives from innovators across Africa and Asia working in assistive tech.

#### Global Disability Innovation Hub

The Global Disability Innovation Hub is a multi-sector, multi-partner research and practice centre bringing together diverse and cross-disciplinary expertise to for disability innovation and inclusion.



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