

ACCESSIBLE DIGITAL TEXTBOOKS CASE STUDY: THE KENYA, RWANDA, AND UGANDA EXPERIENCES

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Abstract

This case study analysis is the culmination of the ADT project which has been implemented by UNICEF and UNESCO and funded by the UNDP Multi-Donor Trust Fund (MDTP) – UN Partnership for the Rights of Persons with Disabilities (UNPRPD) from January 2019 to April 2022.

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Acronyms

ADT	Accessible Digital Textbook
CRC	Convention on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
EPUB	Electronic publication
ESAR	Eastern and Southern Africa Region
GPE	Global Partnership on Education
LACR	Latin and Caribbean Region
LP	Learning Passport
M&E	Monitor and evaluate
MOE	Ministry of education
NGO	Non-governmental organization
NORAD	Norwegian Agency for Development Co-Operation
OPD	Organizations of persons with disabilities
SDG	Sustainable Development Goal
UDL	Universal Design for Learning
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children’s Fund
UNPRPD	UN Partnership for the Rights of Persons with Disabilities
USAID	U.S. Agency for International Development
WIPO	World Intellectual Property Organization



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Executive Summary

It is well recognized and documented that access to quality education enhances girls' and boys' potential for social and economic security as well as reduces poverty. Creating inclusive schools that lead to **learning** is the fundamental challenge for education systems in the Eastern and Southern Africa region. Inclusive education refers to a wide range of strategies, activities and processes to make a reality of the universal right to quality, relevant and appropriate education. To address the challenge of realizing meaningful learning experiences for all children in inclusive education settings, assistive technology is crucial in addition to accessible infrastructure, trained teachers and disability friendly school environment. The global Accessible Digital Textbooks (ADT) initiative, funded by UNPRPD was implemented in Kenya, Rwanda and Uganda by ministries of education and partners with support from UNESCO and UNICEF from May 29, 2019 to April 30, 2022¹, and building on Uganda's earlier pilot on provision of learning materials for learners with visual and hearing impairments implemented from October 2014 to June 2019. Accessible digital textbooks that are developed using Universal Design for Learning (UDL) principles support different learning styles hence can be used in inclusive education classrooms by learners with and without disabilities. Grounded on the UNCRPD and Marrakesh Treaty and with the aim to leave no child behind in learning, the initiative was designed to enhance partnership between designers of curricula, OPDs, teachers, publishers and parents. Kenya, Rwanda and Uganda developed ADTs by adapting the identified components of the primary school curriculum into accessible formats. These ADTs were then loaded onto available devices – tablets, laptops and respective country “education clouds” for use by learners in classrooms. Teachers were also trained on the use of ADT/AT/UDL for effective pedagogy. Awareness raising, advocacy and capacity building on key global

¹ Project inception meeting was held in Nairobi in July 2019.

instruments particularly the UNCRPD and Marrakesh Treaty for ratification and domestication were also conducted. Guidance documents were also generated: on the use of sign language in ADT development; and on procurement of ICT equipment for Persons with Disabilities in Rwanda. This case study draws from country implementation experiences as well as stakeholders' experiences and lessons learned during the life of project. Using the 7 key strategies for building an effective ADT ecosystem², the case study highlights important processes that can be emulated as countries strive to achieve effective learning for all learners in inclusive education settings.

1. Introduction

Achieving inclusive education is not possible without accessible schools that include WASH facilities, learning materials in accessible formats, assistive technology, investment in teacher training and data on children with disabilities. The ADT initiative contributes to mitigating the learning challenge and ensure that all learners with disabilities have access to quality learning materials. The global initiative on Accessible Digital Textbooks (ADT) following Universal Design for Learning (UDL) principles aims at promoting inclusive education by ensuring that all learners, including learners with disabilities, have equal access to learning materials in inclusive learning environments. In Eastern Africa, this initiative has been introduced in Kenya, Rwanda, and Uganda, led by UNICEF Eastern and Southern Africa Office (ESARO) and UNESCO Regional Office for Eastern Africa, and funded by the UN Partnership for the Rights of Persons with Disabilities (UNPRPD) Multi-Partner Trust Fund (MPTF). The multicounty initiative was designed to address one of the key barriers to inclusive education resulting from the inaccessibility of core learning materials. Hence, technology is used to create accessible learning materials. Accessible learning materials assist to consolidate inclusion in line with General Comment 4 on Article 24 of the UNCRPD (the right to inclusive education) and Sustainable Development Goal (SDG) #4 to 'leave no one behind' in learning.

In recent years, Kenya, Rwanda and Uganda have made significant strides towards inclusive education and in contributing to their ongoing efforts, the ADT programme was introduced. The aim of this initiative was to:

1. Enhance the enabling environment for the use of quality accessible digital textbooks to ensure and strengthen inclusive education and access to information by key stakeholders.
2. Improve capacity of the education system and the textbook ecosystem to produce and procure accessible digital textbooks.

1.1 Background to the study

To support the strengthening of an inclusive education system, this case study documents the process of developing an enabling ecosystem for ADT development and use and highlights key lessons learned and promising practices that have been gathered through the pilots in the three countries to remove critical barriers to an inclusive and accessible learning process. The case study has been informed by implementation progress since 2019, critical programme outputs, namely activity reports, guidelines,

²<https://www.accessibletextbooksforall.org/accessible-digital-textbooks-all-initiative>

programmatic consultations, a knowledge sharing workshop as well as information gathered through individual interviews conducted virtually with key informants (implementers and partners) including Ministry of Education officials, teachers, curriculum developers, Organisations of Persons with Disabilities (OPDs), implementing partners, UNICEF officers, UNESCO officers and donors (see Annex 1). Following the analysis presented in the case study, recommendations for the revision of the [Emerging Lessons guidelines](#) will be formulated (see Annex 2).

The case study provides an objective review of the pilot in Kenya, Rwanda and Uganda in order to inform the next phase of the initiative, that is, roll-out, scale up and sustainability at country and regional level. It also highlights optimal approaches of harnessing the use of ADT to support learning of all children using technology and adhering to UDL principles. The goal is for all learners with disabilities to have equal access to quality learning through accessible and affordable digital textbooks in all contexts.

1.2 The ADT Global Initiative

In cognizance of SDG 4 (see Fig 1 below), the ADT initiative was designed to ensure that the curriculum, represented in textbooks, was available in accessible formats so that all children, particularly children with disabilities, would be able to “learn”. ADT require both textbook content adaptation and digital technology to ensure that the textbook is accessible to all learners, including those with disabilities and different learning styles. The adaptation processes are guided by Universal Design for Learning (UDL) principles. Governments, particularly ministries of education (MOEs), and publishers that create and provide textbooks and learning materials in traditional hard copies should also produce them in accessible digital formats.

Figure 1: SDG #4: Inclusive Quality Education for All



1.3 Universal Design for Learning applied to ADT

Printed books cannot offer all the features needed to ensure access for everyone including those with disabilities, and building educational content using the [Universal Design for Learning \(UDL\)](#) framework can benefit all children.

[Universal Design for Learning \(UDL\)](#) is an educational framework that recognizes that all children learn differently and benefit from differentiated learning techniques in the classroom. UDL uses practices, space and materials that engage all children with different learning styles.

When developed following UDL principles, printed books can be made accessible to all learners, whether they are blind or have low vision, are deaf or hard of hearing, have intellectual or developmental disabilities, learning disabilities, or prefer to access information without visual input or in different ways. All learners learn differently and should be supported to do so. The 'one-size-fits-all' approach to education fails to recognize the various learning styles that benefit different learners, including those with disabilities. As a result, instructional methods tend to address only one or two learning styles, often leaving other learners frustrated, less engaged and less motivated to learn. Providing differentiated learning, and/or instruction and materials that meet different learning styles, can help improve learning outcomes. There are, at least, four learning styles (VARK, 2019), although learners often prefer a mix of two or more (see Figure 2):

- **Visual:** Learners prefer information presented visually, such as pictures, diagrams, maps, charts and sign language.
- **Auditory/oral:** Learners prefer to receive information that is heard or spoken, such as lectures, audiobooks, music and group discussions.
- **Reading/writing:** Learners prefer to read books or e-readers and write information in essays or written assignments.
- **Kinesthetic/tactile:** Learners prefer to obtain information through experience and practice, such as simulations and interactive games.

Figure 2: Different learning styles addressed in accessible digital textbooks.



Learners are more motivated to learn when information is presented in a way that builds on their strengths and responds to their individual learning styles. Because they often have limitations in one or more areas of functioning, learners with disabilities are at a particular disadvantage when instruction and materials are presented in only one format. Technology can be a powerful tool for applying UDL principles by allowing children to learn through content presented in different ways; to encourage them to express what they know through different features; and to stimulate their interest and motivate them. The ADT responds to all those criteria.

1.3 What is an accessible digital textbook?

An ADT is a digital tool that gives all learners, including those with disabilities, access to information in accessible formats (see Fig 3 below). It allows children with different learning styles to access the same content, participate in the same textbook-based activities inside and outside the classroom, and have the same opportunities to achieve positive educational outcomes as their peers. ADTs are an adapted version of curriculum-based textbooks used in classrooms. They differ by being digital, accessible, and versatile, allowing users to customize and combine diverse features like narration, sign language, interactivity, the audio description of images and other functions, to suit different preferences, learning styles or access needs. They also include interactive exercises that follow UDL principles. ADTs are typically produced in EPUB3 formats³, require direct installation on an electronic device (tablet, computer, smartphone) or, in some cases, it can be downloaded from a source (like a content access point) or downloaded from the country's learning platform using an internet connection. Once installed, the learner can even use the textbook on the device offline.

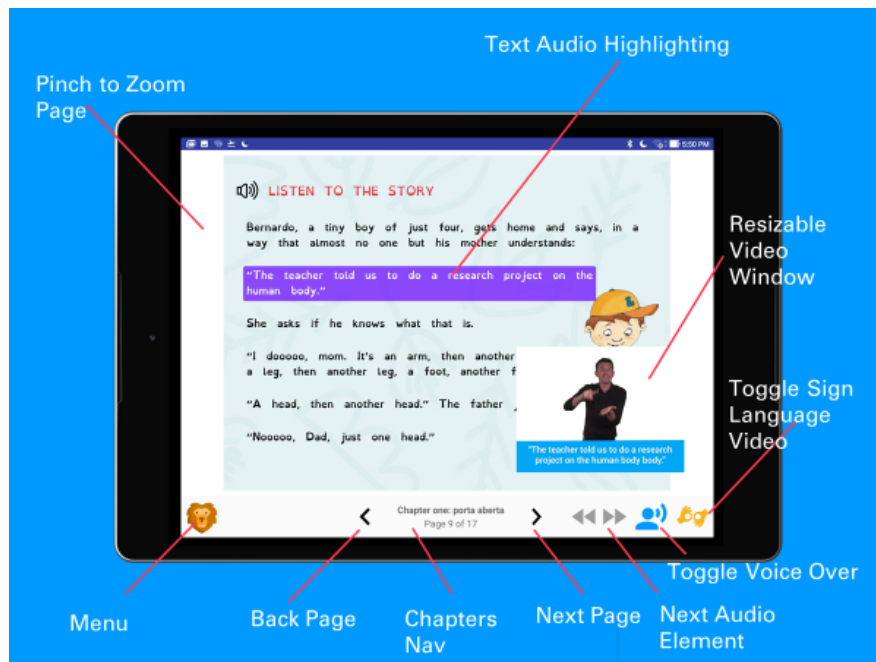


Figure 3: Example of an accessible digital textbook using UDL principles with various technological features that give all children equal opportunities to learn.

³ In order for materials to be accessible to learners with disabilities, physical media like print textbooks require digitization to accessible digital formats like EPUB and PDF. Not only will the content need to be scanned in high resolution, but the material will need to be converted into a format where the text can be understood by the computer and is compatible with a screen reader. A file with the .epub is a popular open-source file format used for storing eBooks and other types of content that allows for various accessibility formats. EPUB3 is the latest version of the format.

2. Country experiences

The goal of the pilot was for learners with and without disabilities in the three countries to have access to inclusive quality education through ADT. In order for this goal to be achieved, an enabling environment for the use of ADT to strengthen inclusive education is required and the capacity of the education system would need to be improved so that the textbook ecosystem would allow production and procurement of ADT and use of ADT to support learning in inclusive settings. Besides working with governments and publishers, the involvement of OPDs as partners was central in all three countries and OPDs were represented in all the countries' Technical Working Groups and involved in the validation process. The ADT initiative is underpinned by UNCRPD, [Marrakesh treaty](#)⁴, national inclusive education policies, national Persons with Disabilities policies mandating equality in access to information. The Marrakesh Treaty in particular provided the impetus for the enabling environment. Whereas Kenya, Rwanda and Uganda had ratified the UNCRPD in 2008, by the end of 2020, all three countries had ratified the Marrakesh treaty (Kenya in September 2017, Uganda in July 2018 and Rwanda in July 2020). In ratifying the Marrakesh Treaty, they indicated national commitment to facilitating access to published works for persons who are Blind, Visually Impaired, or Otherwise Print Disabled. Hence national consultations on ratified Marrakesh Treaties to create awareness and promote domestication and operationalization in Kenya, Rwanda, and Uganda were conducted⁵. As well, ICT equipment procurement guidelines for Organizations of Persons with Disabilities (OPDs) and key government stakeholders, including the Ministry of Education, teachers, publishers, information professionals and publishing companies in Rwanda and Kenya were developed⁶. Capacities of teachers particularly special education teachers and ECD teachers, to adapt and use ADTs and ATs were enhanced. Whereas

⁴ The WIPO-administered [Marrakesh Treaty](#) makes the production and international transfer of specially-adapted books for people with blindness or visual impairments easier. It does this by establishing a set of limitations and exceptions to traditional [copyright law](#). The Marrakesh Treaty was adopted on June 27, 2013 and entered into force on September 30, 2016.

⁵ During the project period 2020 -2021, UNESCO held three Virtual advocacy forums to create awareness and promote the domestication of the Marrakesh Treaty. During the consultations, limited awareness of the Marrakesh Treaty (MT) and National Copyright Law and lack of proper coordination mechanism were highlighted as the main challenges in the domestication and implementation of the treaty in Rwanda. Some of the recommendations made included: (i) intensification of awareness activities for the Marrakesh Treaty and translation of the treaty Kinyarwanda and braille to make it more accessible to Kinyarwanda speakers and people with visual impairments, (ii) creation of a coordinating body to follow up on the implementation of Marrakesh Treaty in Rwanda and development of a roadmap for the implementation of the treaty in Rwanda. Consequently, Rwanda acceded to the Marrakech Treaty in October 2021.

⁶ UNESCO in partnership with Inclusion Resources Africa, a consultant firm ran by a group of persons with disabilities, supported the development of guidelines for ICT equipment procurement for persons with disabilities. The Guidelines are intended to be used by government's institutions, development agencies, information and communication service providers, publishers, libraries, educational institutions, employers, professionals, service providers and Organizations of Persons with Disabilities in Kenya. The guidelines will help entities intending to procure ICT equipment for the education of persons with disabilities to adopt and integrate the best procurement processes and practices to achieve maximum benefits for ICT users with disabilities. The overall aim of the Guidelines is to facilitate the procurement of the most appropriate, effective and efficient ICT equipment for persons with disabilities.

advocacy activities for the promulgation and implementation of laws and policies that promote inclusive education and access to information for persons with disabilities

2.1 Kenya

In **Kenya**, this initiative aimed to leverage the government's Digital Literacy Programme (DLP) which had placed one million tablets in primary schools. During the pilot, KICD focused on adapting three strands (or chapters) from the environmental activities' textbook for first graders. They included the following: firstly, a disability-specific textbook for the three strands – one textbook with audio features for learners with visual impairments, one textbook with Kenyan Sign Language (KSL) interpretation for deaf learners, and another textbook for learners with intellectual disabilities. Thereafter, a textbook for one strand (out of three strands) with different media overlays that enhance accessibility following UDL principles such as audio, simplified text and KSL video insert was developed. Results achieved from the pilot include guidelines for textbook development, capacity development for curriculum department staff, teachers⁷ and other stakeholders(26 stakeholders:14 M;12 F. Of these, five are people with disabilities (3M; 2F)). As part of South-South collaboration, policy advocacy strategies developed and used in Kenya, were used to inform planning and implementation in Rwanda, and in informing future work in Uganda. By the end of 2021, Kenya had completed the adaptation of **two ADTs: Primary 1 Environmental Activities and Hygiene and Nutrition**. However, initially these were not fully adapted using UDL principles but were disability specific ADT but were later consolidated to ensure application of UDL principles in each of these two titles. Training of publishers on 'born accessible publishing' that will bring the development of teaching and learning materials in Kenya to scale. Training of teachers and special education teachers in UDL and use of ICT in education has been ongoing as well as Educational Assessment and Resource Centres (EARC) officers drawn from all the 47 counties in Kenya, followed by field sessions to test the learning. During COVID induced school closures, the ADT were uploaded to the Kenya Education Cloud (KEC). However, evidence generation on the level of access to digital content by learners through Kenya Education Cloud (KEC) still remains a challenge.

2.2 Rwanda

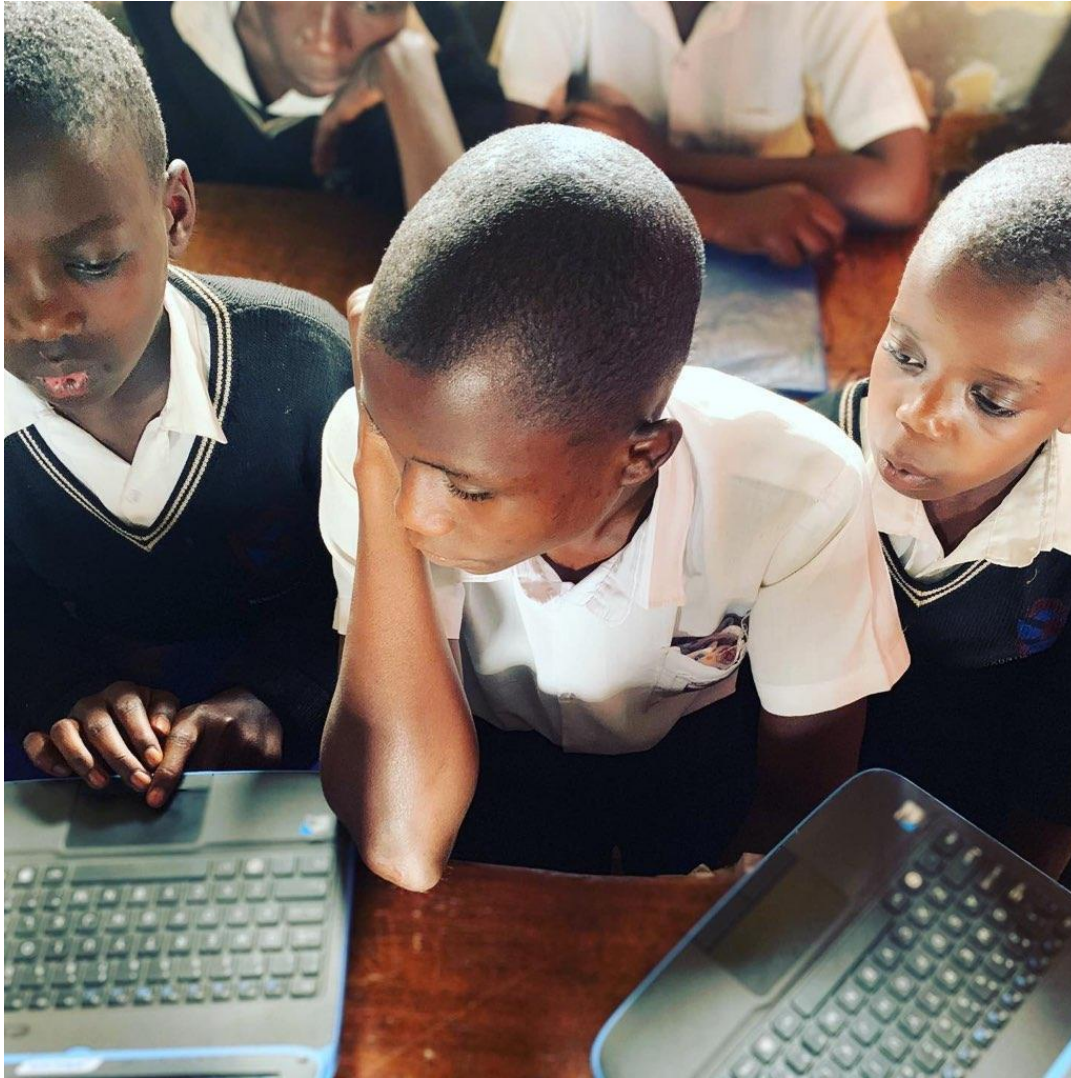
In **Rwanda**, the ADT initiative was grounded on the Ministry of Education's ICT in Education Master Plan which aims to design policies, provide leadership development, ICT Infrastructure, curriculum and content development, teacher preparation and development, higher education, research and innovation and resourcing and implementation. These elements were considered to be favorable to initiate the development of accessible digital textbooks. This project aimed to develop the first ADT using UDL principles for use in inclusive classrooms in Rwanda and adapted **one ADT the Grade 1 English** textbook to ADT and conducted preliminary field tests. Through advocacy and consultations, Rwanda signed the Marrakech Treaty in 2020 and advocacy towards raising awareness, domestication and

⁷ To strengthen the capacities of teachers on the application of Assistive Technologies and adaptation of ADTs, UNESCO in collaboration with the Ministry of Education Directorate of Special Needs Education and the Kenya Institute of Special Education (KISE) organized a five-day workshop for 30 Early Years of Education (EYE) special teachers where they were taken through the available Assistive Technologies (both software and Hardware) for learners with Visual Impairments (VI), Hearing Impairments (HI), Physical Impairments (PI), Learning Impairments (LI) and Intellectual Disabilities (ID); and on Laws and Policies that promote access to information for persons with disabilities.

operationalization continued. After completion of the project, UNICEF Rwanda has been working with Rwanda Basic Education Board to develop curricula aligned textbooks that are pedagogically adapted to be accessed by learners with and without disability. Textbooks are adapted by trained teachers using the Universal Design for Learning (UDL) approach. The ADT is being used in the 60 inclusive model schools and teachers have been trained on inclusive pedagogies and their application using UDL principles. With other source of funding, Rwanda is currently finalizing the production of 55 ADTs following UDL principles that will be available on the REB platform this year. Rwanda has also established a Policy Board and Management Committee composed of UN agencies, (OPDs), key government stakeholders including teachers, information professionals and publishing companies to oversee the work on inclusive education which includes accessible educational materials.

2.3 Uganda

In **Uganda**, thanks to previous UNPRPD financing support, UNICEF Uganda Country Office and UNESCO had jointly implemented a four-year (2015-2018) UNPRPD pilot project aimed at increasing access to information and inclusive education through accessible textbooks and learning materials. Through this pilot, a Policy Board and Management Committee was assembled composed of representatives from UN Agencies and Programmes, Organizations of Persons with Disabilities (OPDs), Government Agencies and other relevant implementing bodies and publishing companies. Chaired by the Ministry of Education and Sports, this committee has been instrumental in fortifying the enabling environment for access to information and use of Assistive Technology (AT). **Two ADTs (Grade 4 and Grade 6 Social Studies)** were adapted into accessible learning materials for visually and hearing-impaired learners, tested and validated, and teachers were trained on the use of these materials. Training was conducted among stakeholders and partners on accessible publishing. The focus was to document the experiences of the earlier pilot highlighting lessons learned, including from similar initiatives in other countries, in readiness for scaling up in the country and to inform similar interventions in the region. Uganda continued to build capacity of head teachers and teachers to facilitate learners' effective use of the ADTs developed during the pilot. Lessons learned during the pilot informed the revised Inclusive Education Policy which is currently undergoing the final stages of government approval processes. Lessons learned from the pilot schools continue to be documented. To foster sustainability and mainstreaming of the adaptation of textbooks and teacher training, engagement with Kyambogo University Kampala, the only Public University with a fully-fledged faculty of Special Needs and Rehabilitation with a mandate to train Special Needs Teachers continues. As a result of the challenges posed by Covid-19, the ADTs produced in Uganda were uploaded onto the education platform, Kolibri, where learners can access them.



Credits:@ Julie de Barbeyrac, 2019, Uganda.

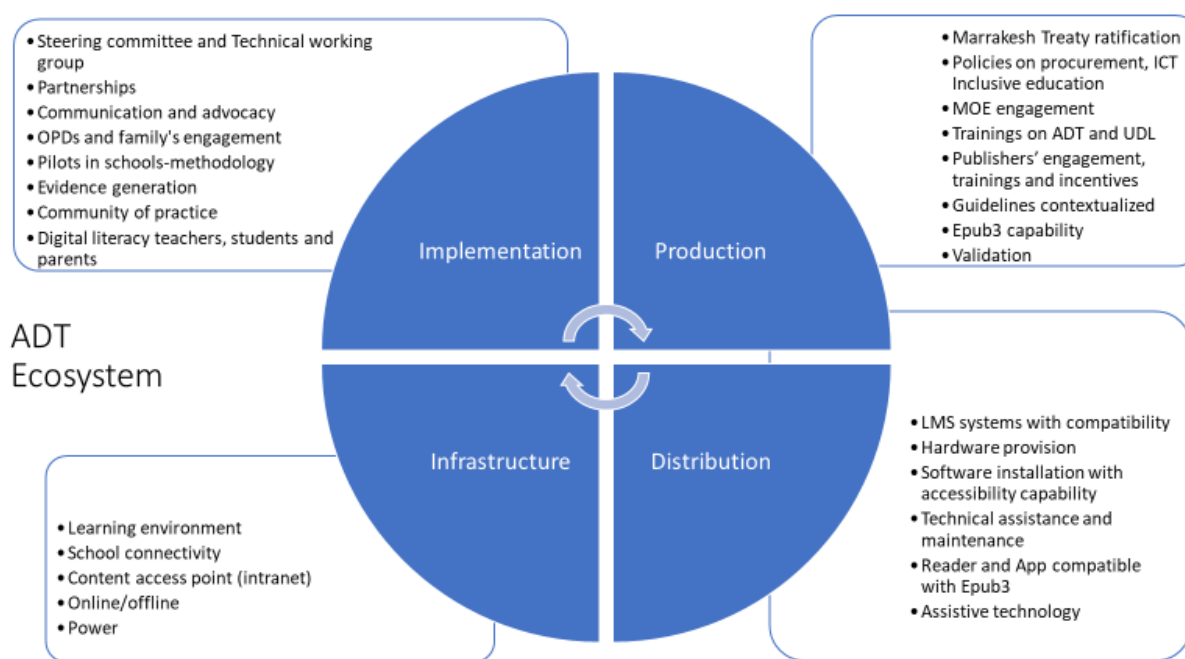
3. ADT ecosystem: critical components for an enabling environment

The ADT programme in each country needed to be conceived within the larger ecosystem that supports its implementation. In fact, ensuring that ADTs were accessible to all learners required a multi-faceted and holistic approach in which the focus wasn't only the accessibility of the end product but also on the entire ecosystem that surrounds its creation. The ADT ecosystem consists of four interrelated phases: production, distribution, infrastructure, and implementation. These components are dependent on each other, overlap in some cases and all phases need to be considered for the ecosystem to be effectively developed. The way in which ADTs were produced and distributed may have impacted how they were implemented and accessed; and vice-versa. An understanding of the existing infrastructure available and the implementation strategy should have influenced the way in which it is produced (more detail can be found on the [UNICEF Accessible Digital Learning Portal](#)). By understanding and planning for all aspects of the accessible digital content ecosystem, every country was better positioned to adapt content, tools,

services and solutions to the various contexts, implementation dynamics and learners’ needs. Note that funding resources were needed at all phases and lack of investment at any level could impact the whole implementing chain.

From the lessons learned captured during the interviews and the knowledge sharing workshop, key components of the accessible digital textbook ecosystem have been identified as essential to ensure a successful implementation. The diagram below summarizes the elements that need to be put in place in a holistic and comprehensive manner. If one or more of these elements were overlooked the risk is that some learners would not be able to access and benefit from the ADT, and teachers may not have the appropriate skills and support to successfully implement these solutions in both classroom and remote learning environments.

Figure 4: Accessible digital textbook ecosystem



This section provides an overview of elements that have been put in place through the ADT project in all three countries and recommendations on the ones that should be taken into consideration to create an enabling environment and reach every learner.

3.1 Production phase

The **production phase** consists of the steps leading to the co-creation of new accessible educational content or the adaptation of existing ones. As such, countries involved should, beforehand, embrace inclusive education and the involvement of stakeholders, including OPDs and persons with disabilities in policy formulation, planning and implementation. They all should be committed to improving the inclusion of children with disabilities in quality inclusive education settings. This **engagement** was evident for all three countries through the rich policies supporting inclusive education and the international conventions they have signed.

Throughout this implementation period, UNESCO has been supporting the revision, development, or implementation of **policies** for Inclusive ICTs in Education for Persons with Disabilities and raised awareness with teachers' union leaders, selected mainstream and special schoolteachers and head teachers on policy implications. Additionally, UNESCO facilitated Marrakesh Treaty consultations in all three countries that have led to the accession of the **Marrakesh Treaty** by Rwanda in 2020 and reinforced implementing processes in the other two signatory countries. One key element that is yet to be developed in the implementing countries relates to **policies on procurement** of textbooks. In cognizance of inclusive learning, the ministry of education needs to move towards requiring that all textbooks be produced following the ADT guidelines alongside printed versions. This would be a good incentive for publishers and editors to reinforce inclusive education and reduce barriers to learning for children with disabilities. In Kenya, government acknowledged that engagement with publishers has been carried out independently by a local technology partner, eKitabu, which trained **publishers** on the production of Epub3 formats after being trained under the UNPRPD project. However more engagement and trainings are needed to ensure integration of UDL principles into the production of born accessible materials in Epub3 formats, which, in return, would be more cost-effective. But not all countries are working directly with publishers for curriculum textbooks. In Rwanda, for example, according to government policy, the REB produces all educational content in house. Therefore, ADTs were produced in the same way. This monopoly approach permitted them to curate and validate the quality of the materials, as well as valuing the existing assets inside the ministry of education. In countries where the MOE issue tenders for textbooks production, an open market should move towards the inclusion of ADT in these tenders following the UNICEF guidelines.

ICT equipment procurement guidelines were also produced in all three countries, as well as *facilitator's manuals for training of teachers on assistive technologies and adaptation of ADT* when using them in their lessons, and *guidance to promote Easy-to-Read features into ADT for children with intellectual disabilities* were produced in Kenya. Lastly, guidelines for the use of interactive accessible digital content were produced, distributed to schools, and used by teachers during the implementation phase and helped bridge the digital literacy gap.

Another important aspect to consider when creating ADTs refers to the development of **guidelines** to ensure the adherence to appropriate standards, especially because ADT content adaptation process involves ministries of education and diverse stakeholders. In this regard, UNICEF supported the development of a *Guidance on sign language usage in accessible learning materials* for ECE and early primary levels. The regional office hired a female deaf consultant to be the technical lead in developing the guidance. The Guidance was developed in consultation with national associations for the deaf (Kenya, Malawi, Rwanda, Uganda, Zambia) and deaf educators (5 males, 3 females) after which it went through a rigorous peer review process involving experts (representatives of national associations of deaf, educators from renowned universities, global DPOs, international partners). This was to support and reinforce local sign language usage for effective learning especially in the early years instead of the Exact English Sign system commonly used for teaching and learning in schools. The use and the official recognition of sign languages as the natural and most accessible first languages are essential to support children in their linguistic, cognitive, and social-emotional development. They need sign language as a mode of instruction and, therefore, the consistent use sign languages in the development of accessible digital teaching and learning materials for children who are agreed by a broad consensus among established UN policies, the worldwide deaf community represented by the World Federation of the

Deaf (WFD), and scientific evidence all strongly support the fact that natural signed languages are essential for the cognitive and psychosocial development of deaf children.

Finally, a central component to examine in this phase involved **awareness raising** and **capacity building**. Not only the technical working groups and teachers who worked on the adaptations were included in this process but also decision makers. In fact, sensitizing heads of relevant ministerial sections on the holistic goals of the initiative would ensure steady incorporation of pertinent elements into the system plans and budgets leading to sustainability of ADT. In Kenya, a Technical Working Group was formed and trained but a Steering Committee to provide oversight wasn't established, resulting in limited awareness and lack of guidance of the project by ministry executives with decision making authority thus constraining the planning for activities and budgets to maintain the production of ADTs beyond the life of this project. In Rwanda, to reinforce the capacity of different people from the government of and other stakeholders to enable them to contribute to the development of ADT, several trainings were conducted with 6 DPO representatives, the Representative of overall OPDs in Rwanda, MINEDUC and Rwanda Education Board staff, teachers and CSOs' delegates. Capacity building for special ECD/ Early Years of Education (EYE) teachers on the use of assistive technologies and adaptation of ADTs was carried out in Kenya, Rwanda, and Uganda⁸.

The elements of this phase are underpinned by policies that support inclusive education and learning as well as access to reading material by all citizens (Marrakesh Treaty). The education sector leads the production process working with partners such as ICT sector and the ministry responsible for persons with disability, Organisations of Persons with Disabilities (OPDs), universities, publishers, teachers including teachers with disabilities, donors who are all critical to the development of ADT that contribute to effective learning for all. The ultimate goal for the production phase is to adopt a cost-effective approach which requires education textbooks and learning materials to be born accessible.

3.2 Distribution phase

The **distribution phase** concerns the steps to be taken after the "educational product" (ADT/adapted learning material) is finalized. This involves the need to define in which form, support, and modality the ADT will be disseminated to its final users. Because of the wide range of formats being used (sign language video, audio description, navigation, interactivity of textbooks), the whole distribution chain needed to support the diverse accessible adaptations that were integrated into the Epub3 format. To this end, all three countries developed ADTs in Epub3 formats and planned to distribute them on their respective **platforms** which support accessibility to some degree. For example, the [Rwanda Education Board \(REB\) online platform](#) and the [Kenya Education Cloud](#) supported all accessible formats integrated in the Epub3 format, however the open-source offline learning Kolibri platform used in Uganda had some limitations. In fact, Kolibri offers many advantages if the content and formats are simple text, images and videos. For the ADT, it is limited as it does not completely support the newest technologies like Epub3 with media overlays support, rich interactivity and dynamic asset support. Therefore, a full analysis and understanding of available platforms and their limitations informed the type and complexity of accessible content produced.

⁸ In Uganda, UNESCO in collaboration with MOES held a five-day capacity building for 40 special ECDE teachers on the application of assistive technologies and the adaption of accessible digital textbooks.

The analysis also needed to consider the type and provision of **hardware** used in schools and their compatibility and capacity to store the content, together with the progressive development of new technologies to support the integration of accessibility features. In 2015 in Uganda, the content was adapted to cater disability-specific textbooks (one for Blind/Visually impaired, and another for Deaf/Hard of Hearing) directly installed in the provided 2 laptops per piloting schools. This format was adopted in response of the available offline open-source software that could support sign language video at the time. In both Kenya and Rwanda, adapted content was uploaded onto the tablets and laptops provided to schools as part of broader ICT in education initiatives. Then, in Kenya, with the availability and the limits of the open-source EPUB2 format, the UDL principles were partially integrated, which means that the textbooks include all accessible formats but were presented in 3 different strands through media overlays- one textbook with audio features for learners with visual impairments, one textbook with Kenyan Sign Language (KSL) interpretation for deaf learners, and another textbook for learners with intellectual disabilities. In the case of a fully UDL textbook (integration of narration, sign language, interactivity, the audio description of images and other functions) in the newly EPUB3 format, like in the case of Rwanda in 2018, software based assistive technologies like **screen readers and applications** installed within the devices supported all the accessible formats of the ADT and represent, as of now, the format that is closer to the benchmarks of UDL digital content for low resource context. These three levels of accessibility are reflective of country available resources and digital progression and are all valid in supporting the learning needs of children with disabilities.

Nevertheless, **technical assistance and maintenance of the technology** are an important part of this phase because they ensure the viability of the technology in the field. In the case of Uganda, it was gathered that there were numerous technical problems that arose, and the one designated technical person wasn't enough to support the needs occurring in all the 20 pilot schools located in 16 districts. It is evident that schools require timely ICT support to ensure the educational benefits accruing from use of ADTs by learners and teachers. Rwanda and Kenya, on the other hand, have not planned for this type of support. However, in Rwanda teams of trained ICT teachers provide this support to their schools.

3.3 Infrastructure phase

Infrastructure refers to the external and contextual conditions that needed to be considered while developing and distributing accessible learning materials. The goal was to enable learning for children, with and without disabilities, through digital resources, and to do so those digital resources needed to be accessed by those learners. Some of the greatest challenges were **access to the internet, access to power, devices**, hardware, lack of distribution point, safe storage and other elements related to physical barriers. To address some of these challenges, the project in Uganda incorporated solar panels to power the devices. This was to ensure schools could effectively use the projectors, laptops and tablets provided. On the other hand, access to internet connectivity was, in all three countries, solved differently. In Kenya, the ADTs were previously downloaded on several tablets and used in an **online/offline mode**, but only for the pilot schools. In Rwanda, the ADTs were uploaded on every district distribution point called **Content Access Points (CAPs)** that are self-contained solution for addressing connectivity concerns in low-connectivity settings. They consist of a device with preloaded materials by the MOE, similar to a router that allows learners and teachers to connect to as they would with a wireless connection. The students can browse through the library, download materials and use them offline.

Finally, with regards to the **learning environments**, there is need to consider whether children will use the ADTs in schools only or also at home. Ideally, children should be able to access ADTs in all settings, but as observed during the pandemic, children had rarely access to learning materials outside of school. In addition, many children, especially those in lower wealth quintiles, did not have access to internet outside their schools and families didn't own devices for learning purposes. Notably at school learners may have access to a desktop or tablet, whereas at home the only device that may be available could be a low-cost cell phone or a radio. Unfortunately, the ADTs produced in all three countries were not compatible with cell phones, thus limiting access to a great number of children learning remotely, but current pilots in Latin America and the Caribbean region are testing this capability which, hopefully, will solve issues of limited devices for many children.

3.4 Implementation phase

Implementation refers to the considerations that must be made all along the process to ensure that ADTs uses UDL principles to meet the needs of children with disabilities (and all learning styles) so that learning is inclusive, that learners are appropriately supported and that their feedback and learning improvements are registered.

As one of the first steps, the establishment of both a **steering committee and a technical working group** dedicated to the coordination, planning, and oversight of the ADT project; as well as production and implementation of ADTs respectively, enabled this project to position the ADT initiative within the ministry of education as a collaborative and inclusive process among diverse partners and experts. Ideally, these committees should remain and participate in all curriculum-related decisions to ensure children with disabilities are considered when developing content and to advocate for realistic target setting and budget allocations with decision-makers. Uganda and Rwanda both established these two levels of committee, but as mentioned earlier, Kenya only established a technical working group, which might have impacted the momentum of the initiative beyond funding from UNPRPD for the pilot. Furthermore, Rwanda and Uganda have established a Policy Board and Management Committee composed of UN agencies, (OPDs), key government stakeholders including teachers, information professionals and publishing companies to oversee the work on inclusive education which includes accessible educational materials. This formal institutionalization combined with a steering and technical committee composed of local **partners** was a strong factor in view of the evident scaling and sustainability of the project. Another factor for success was the fact that some technical working groups had, among them, a strong coordinator with significant knowledge of accessible technology in education. Having internal expertise on technology within the MOE seemed to be an important variable to consider. It is also a good practice to form strong partnerships with local OPDs, for learning on technical aspects, validating the quality of the content produced, and contributing to advocacy efforts. Uganda, during the first phase of the pilot (2015 to 2018), has consolidated partnerships that continue to this day, still collaborating to move the agenda forward. Nevertheless, in Kenya, the members of both committees were trained on inclusive education, ADT production and usage in classrooms, UDL principles within educational technologies and in classroom settings, and ICT (basic digital literacy) through 5 sessions⁹. It was important for all implementing members to understand the project in its

⁹ In Kenya, through the ADT project, the TWG platform, KICD, the Directorate of Special Needs Education (DSNE), publishers and OPDs have enhanced understanding and capacity on ADT project and UDL principles in the context

entire complexity to ensure engagement and continuity. This holistic training should also be delivered to implementing teachers and head of schools.

A central element for a strong implementation related to the training of the TWG that produced the accessible content as mentioned in the *Production phase* and the teachers that were involved in the testing in schools. In Kenya, 300 teachers were trained on digital literacy. Training of teachers on how to integrate the ADT within their lessons is a critical factor as it can be an impediment to learners' ADT use in classrooms. Basic training and on-site support to teachers to enhance their ICT comfort levels and the pedagogical use of the ADT in the classroom following UDL principles cannot be overemphasized. Teacher WhatsApp groups are common support platforms in all countries as well as master trainers who can support their peers and those in neighboring schools. In Rwanda, teachers and students involved in the testing were trained on the key features of the ADT. The actual user testing was conducted among a group of 10 learners and 3 teachers¹⁰ and feedback was collected and used to update the prototype. With operational support from the UNICEF implementing partner, Humanity and Inclusion, testing and roll-out of the ADT have been implemented on a larger scale through the distribution of five tablets per school in 10 model inclusive schools to reach approximately 400 children with disabilities (approximately 49 per cent girls). Furthermore, a toolkit was developed to show how teachers can use the technology solutions adopted for the ADT to ensure that skills of children with disabilities are strengthened.

Another important aspect that was considered related to **awareness raising, advocacy and communication** with diverse populations. Interviews with key informants revealed that more communication and advocacy should have been organised to raise awareness among policy makers, decision makers, publishers headteachers, teachers and families. This wide range of target population strives to present the initiative holistically but also adds a layer of complexity. Therefore, having a clear communication plan developed during the inception phase of the initiative to influence perceptions about it would certainly contribute to increasing awareness. This recommendation was considered by the current project in LACR where clear contextualized messages are aimed at families, teachers, publishers and policy makers, among others.

On the more practical aspects, a defined **methodology** for implementation, including clear validated steps for **testing and piloting ADT in schools**, were well defined for this project but experience has shown that some elements of the [methodology proposed in the global guidelines](#) needed to be better detailed. For instance, some components of classroom testing like the observation checklist and the usability of the prototype in the classroom have been developed locally based on the experience of the MOE with testing curriculum content because they were not elaborated in the guidelines. Nevertheless, all three countries were able to develop their own methodology with support from experts in the ministries of education, and this has enriched the research and development of this innovation. Thanks to this experience, new implementing countries are now benefiting from increasingly valid steps developed with support from UNICEF Innocenti-Office of Research which are presented in Annex 3.

of inclusive education. Five coordinating and capacity development sessions were conducted benefiting 26 stakeholders (14 M, 12 F).

¹⁰ Deaf: 2 girls, 3 boys, 1 male teacher; Blind: 3 girls, 2 boys and 2 female teachers.

Finally, data collected from the pilots combined with knowledge generated through country experiences were documented in all three countries. **Knowledge sharing** workshops, articles, videos, human interest stories, good practices and reports were documented and shared on the [UNICEF ADT platform](#).

In conclusion, many factors needed to be considered throughout the implementation of the ADT project, including the production of new accessible content or the adaptation of existing ones, to the definition of the appropriate supports and means of distribution, the assessment of the conditions related to power and connectivity in which the ADT will be used, and the ways in which they were implemented in country and at school level. Understanding these complex interrelations enabled all stakeholders to take concrete actions to bridge gaps and establish clear roadmaps to sustain this initiative in their countries.



Photo 2: UNPRPD joint programme knowledge sharing workshop in Nairobi, August 2019. Credits: Julie de Barbeyrac, 2019, Nairobi, Kenya.

4. Lessons Learned

This section highlights the lessons learned during the pilot implemented in Kenya, Rwanda and Uganda and were captured through a set of 27 individual interviews held in March 2022 with selected key stakeholders involved in the joint ADT initiative from these countries and beyond (see Annex 4). Their reflections, perceptions, opinions and experiences are central to not only bring a normative view but a realistic one regarding this initiative in the region. These important lessons for consideration in moving the initiative forward are organised within the framework of the seven (7) critical strategies to achieve sustainable change.

The development and implementation of the ADT initiative requires multisectoral engagement by multiskilled professionals from the education sector including teachers, OPDs, publishers, ICT professionals, and others. It is coordinated efforts by these teams that facilitate the establishment and sustenance of the ADT textbook development ecosystem so that leaving no one behind in learning can be realised. UNICEF guidelines outlines seven (7) critical strategies that facilitate this process. They are:

1. **Policy:** Relevant policies are required to ensure that ADT is well grounded so as to guarantee that learners with disabilities have access to ADT and that there are mechanisms to check learning outcomes of users.
2. **Advocacy:** UNICEF is engaged in negotiations and advocacy towards the goal of having all curriculum materials adapted to ADT in the implementing so that the goal of access to learning for all is achieved.
3. **Partnerships and engagement:** The establishment of effective partnerships among stakeholders including donors involves building trust including with children with disabilities, parents and communities, whilst harnessing and building local skills to make decisions that lead to effective implementation of the initiative.
4. **Capacity development:** Training is critical to ensure capacities of curriculum developers, publishers, authors, OPDs, teachers, learners, parents and all stakeholders involved in the process are enhanced to be able to contribute to development of ADT using UDL principles.
5. **Innovations:** This is critical to the development of ADT using UDL principles. The use of accessible technology to drive demand whilst increasing supply with the aim of keeping costs as low as possible.
6. **Evidence and use:** Learnings from the pilot countries are generated and disseminated. This will allow for the guidance and standards developed for ADT development using UDL principles to be validated so that they can be adopted for use by all stakeholders involved in the ADT book chain.
7. **Knowledge sharing:** The existence of a central knowledge portal (www.accessibletextbooksforall.org) ensures all experiences and knowledge generated through the initiative is consolidated and readily available to all governments, partners and donors who may be interested.

4.1 Policy

Although supportive education sector policies that seek to enhance inclusive education exist in all three countries, informants noted that comprehensive policy implementation was a challenge. Hence even where sound policies existed, their impact was limited due to implementation limitations. This may be due to funding constraints which results in some policies being implemented piecemeal, if at all thus reducing their effectiveness. Where adequate policies on Inclusive Education that include accessible technology exist, the recommendation is to advocate for comprehensive policy implementation. However, where policies are inadequate, it would be prudent to amend existing policies to give more prominence and commitment to ADT. It is important to ensure OPDs are part of all policy processes. The policies referred to included: inclusive education, ICT in education, and textbook procurement policy. With supportive policies in place, ministries of education could pragmatically plan and budget for the progressive realisation of inclusive education.

In order to ascertain ownership, commitment, accountability and to be able to mobilize additional resources required for early stages of development and use, ADT plans should be acknowledged as part of inclusive education strategies and reflected in Education Sector Plans (ESPs). This would also contribute to uptake of ADT by textbook publishers to create born accessible textbooks. The incorporation of accessibility requirements into national procurement policies would facilitate mandatory consideration of textbooks with accessible features for children with disabilities and contribute to the operationalization of Marrakesh Treaty. Kenya and Rwanda had ambitious ICT in education/digitization initiatives – By 2018 Kenya’s ICT Authority had distributed 1 million devices to over 19,000 public primary schools as part of the ambitious digital literacy programme. Similarly, Rwanda launched the Smart Classroom initiative in 2016 initially providing devices to secondary schools to provide digital literacy and later expanded to primary schools. Through the ADT initiative, the available hardware provided by government (tablets/laptops) were loaded with accessible learning materials thereby the scope of their use and enhancing hardware relevance to effective learning and improving learning outcomes. All government informants concurred that ADT provides content to ensure that hardware available in schools is effectively used for learning purposes.

4.2 Advocacy

It is evident that this initiative helped ignite a broader concept of assistive technology (AT) in education as reflected by the key stakeholders interviewed. This has contributed to a growing appreciation of the need and relevance of ADT especially among the stakeholder groups involved in the initiative. The ADT initiative presented a relevant entry point for meaningful ministry of education and ministry of ICT engagement and collaboration. In addition, the recent impact of COVID-19 on schools resulting in extended closures, highlighted additional inequalities between learners with disabilities and without in terms of available online learning materials. This stimulated need to produce accessible digital content for children with disabilities leading to more efforts and budgets from donors and ministries of education.

Advocacy at all levels is required to ensure that education stakeholder groups from policy makers and OPDs, to teachers, parents and learners are informed of ADT as a strategy to achieve learning for all. The need for a Community of Practice – including teachers, publishers, OPDs to push the agenda and raise awareness. It is important to ensure ADT processes are known and ADT is promoted as a strategy for inclusive education and effective learning for all. Hence there is need for both of communication strategy as well as advocacy strategy A representative of OPD stated emphatically that in each country there is *“need for stronger communications and advocacy strategies” targeting specific stakeholders including OPDs, parents of children with disabilities to ensure inclusive engagement throughout the processes and that no critical stakeholders are left out of the initiative.*

4.3 Partnership and engagement

Upon reflection, it was agreed that multistakeholder ADT Technical Working Group (TWG) should comprise software developers and designers in addition to ministry of education representatives, curriculum developers, teachers of children with disabilities, and OPDs. Representatives of OPDs were pleased to be part of the TWG and they felt that their contributions mattered, and one interviewee cautioned that *“OPDs must be fully involved from the beginning to the end and must be involved in advocacy activities that target teachers, parents and decision makers”*. In Kenya, representatives of the Organization of Person with Disabilities namely United Disabled Persons of Kenya (UDPK), Kenya

Association of Parents of the Deaf (KAPD), Kenya Association of Persons with Intellectual Disabilities (KAIH) were incorporated as members of the TWG where they were part of the team and provided input into all phases of the ADT ecosystem and were critical in the process for adaptation into sign language (see “Kenya TWG Good Practice, 2021”). In Rwanda not only was Humanity and Inclusion a member but so were representatives of Rwanda National Union of the Deaf, the Rwanda Union of the Blind, and the National Union of Disability Organizations in Rwanda. In Uganda, representatives of Enabling Services Uganda (an Organisation of Persons with Disabilities) have been a key stakeholder in the adaptation process and in the inclusive education policy development processes.

In Kenya and Uganda software developers and designers were not included in the TWG but on hindsight these professionals are key in providing the necessary guidance on software and hardware related issues that influence functionality of the ADT ecosystem.

The ADT Steering Committee comprising policy makers and decision makers are expected to set the national ADT agenda together with the TWG, provide oversight and enforce accountability mechanisms. The ADT initiative provides opportunity to have all stakeholders at the same table to address inclusive education on a national multisectoral platform. This platform would facilitate discussions on progressive realization of inclusive education and therefore moving from special education to inclusive education.

4.4 Capacity development

Universal Design for Learning (UDL) was the initial training for TWGs to ensure that all stakeholders comprehended UDL and that the principles would be applied in the adaptation of textbooks in both Kenya and Rwanda. This training was compound with the general presentation on the ADT initiative, the methodology for producing accessible content and piloting, workshops on how to produce UDL exercises using the accessible technology, presentations on accessible technologies (EPUB, Daisy), rights of children with disabilities to quality education and inclusive education. The TWG in Kenya comprised of 26 members (12 female and 14 male including 2 female and 3 men with disabilities) from various departments of the MoE including the Kenya Institute of Curriculum Development, Directorate of Special Needs Education (TWG Co-Chair, Directorate of Primary Education, Directorate of Quality Assurance and Standards, Kenya Institute of Special Education (KISE), Kenya National Examinations Council (KNEC), Teachers Service Commission (TSC); OPDs - United Disabled Persons of Kenya (UDPK), Kenya Association of Parents of the Deaf (KAPD), Kenya Association of Persons with Intellectual Disabilities (KAIH); Kenya Publishers Association, Kenya Publishers Association, eKitabu and UNICEF. In Rwanda the TWG comprised of Rwanda Education Board (REB): Curriculum, Teaching Learning and Resource Department, ICT in Education Department; University of Rwanda; Ministry of Education; and 3 PwD representing the Rwanda Union of the Blind (RUB), Rwanda National Union of the Deaf (RNUD), National Union of Disability Organizations (NUDOR); eKitabu and UNICEF.

In Kenya 300 teachers’ digital competencies have been strengthened as well as meaningful integration of effective pedagogy which incorporating technology-supported learning. In addition, the UNESCO Regional Office for Eastern Africa supported training of special needs education teachers (EYE) on Assistive Technologies (ATs) and Accessible Interactive Digital Textbooks including adapting content to ensure inclusive education and access to information for learners with disabilities in Kenya.

In Rwanda, a toolkit was developed which was used to train teachers on the use of ADT to ensure effective learning of children with disabilities. Through partnership with Humanity and Inclusion,

distributed 5 tablets per school in 10 model inclusive schools which enroll 400 children with disabilities (approximately 49 per cent girls).

UNICEF Kenya has supported KICD to develop a training programme for publishers on ‘born accessible publishing’ that will bring the development of teaching and learning materials in Kenya to scale. Kenya Institute of Special Education (KISE) has trained 237 teachers in Universal Design for Learning (UDL) and use of ICT in education that targeted teachers from primary, secondary and teaching colleges.

It was a common reflection that at initial stages, all stakeholders need to be sensitized on universal design for learning (UDL) principles and the “big picture” of ADT development as a strategy to achieve inclusive education with learning for all. Structured training of publishers is key to ensuring the required capacity to shift towards born-accessible textbooks which is the long-term goal of the initiative.

Initial teacher training & in-service is critical to ensure all teachers are equipped with the skills to effectively facilitate learning in classrooms and remotely that have ADTs. The training should validate that “pedagogy incorporates ADT and that ADT does not replace good pedagogy in the classroom”. Not only should the training include IT proficiency but also “mindset transformation” – to embrace the need for IT/ADT/AT in teaching and learning. Teachers need to learn to that they should allow learners to explore gadgets knowing that exploration is part of the learning process. With school-based peer ICT support, teacher confidence can be enhanced. One of the informants, a teacher, remarked *“because many of us are not comfortable with technology, we think it is the same with learners, and yet frequently learners with disabilities are curious and explore tablets without fear and they quickly learn how to manipulate it; learners with disabilities enjoy engaging with technology and they learn”*.

School administrators’ capacity is required to oversee use of devices/equipment in classrooms, as well as its storage, management, and maintenance. Reflecting on implementation experiences, there is need to develop an ICT support system at decentralised levels to reach schools periodically and systematically.

4.5 Innovations

Because every country works on distinct platforms, using different publishing tools and formats, there is need to provide technical support in each country; work with their technology professionals to identify gaps in their technology using local resources. Building local capacity, engaging with local partners and publishers as well as with the MoE is the most sustainable and successful approach to produce the ADTs. Accessibility of technology platforms, lack of accessible materials, offline support, and lack of access to assistive technologies and services still prevents many learners from accessing sufficient content to enhance their learning. By completing the *Country Readiness* and *Technology Ecosystem questionnaires* with their partners, all countries can undertake deep analysis of the digital education supply chain, including infrastructure for use in and outside the classroom. This would lead to a more systematized production process that will logically lead to scaling up production of ADTs.

4.6 Evidence and use

Challenges noted in the consistent usage of ADTs in classroom include insufficient quantities of tablets/laptops for access by learners with disabilities, storage and maintenance issues, teachers and school administrators concern about risk of damages. The pilot was meant to gather information on usability of the prototype and acceptability by learners and teachers. Thereafter assessments must be conducted to determine to what extent children with and without disabilities are learning with ADT and

how this impact on learning outcomes as well as inclusion. The new methodology is presented in Annex 3.

It is combination of UDL principles and understanding of learning styles that contributes to a content adaptation process that is more inclusive for learners with disabilities in a wider range of contexts and can improve learning outcomes for all learners. There is need to gather evidence and document the impact on children's learning outcomes where ADTs are used by learners with and without disabilities in inclusive education settings.

The ADT pilots highlighted gaps in the content supply chain: from publisher awareness, adoption of newer tools, delays caused by numerous validation steps which can be simplified, distribution challenges and reluctance regarding increased cost. A cost-benefit analysis would strengthen the understanding of extra cost related to adaptation of printed textbooks into accessible digital formats as opposed to born-accessible. This would contribute to evidence-informed advocacy initiatives.

4.7 Knowledge sharing

In country, there is need to have targeted dissemination of knowledge generated initially among the local ADT stakeholder community and extended to education community, ICT community, OPDs and the public. The creation of national and regional Communities of Practice on ADT would not only share existing knowledge and good practices but also continually document learnings, push the innovation as well as organise on-site learning exchanges. Development Partners and global partners who support inclusive education such as Norway, USAID, FCDO, have been engaged in the country processes and should provide continuous support that contributes to sustainability efforts.

All documents emanating out of the ADT initiative including human interest stories and lessons learned, standards and policies should be stored in one centralized, accessible and user-friendly platform. This would ensure countries interested in initiating this initiative have access to all relevant information and guidance.

5. Conclusion

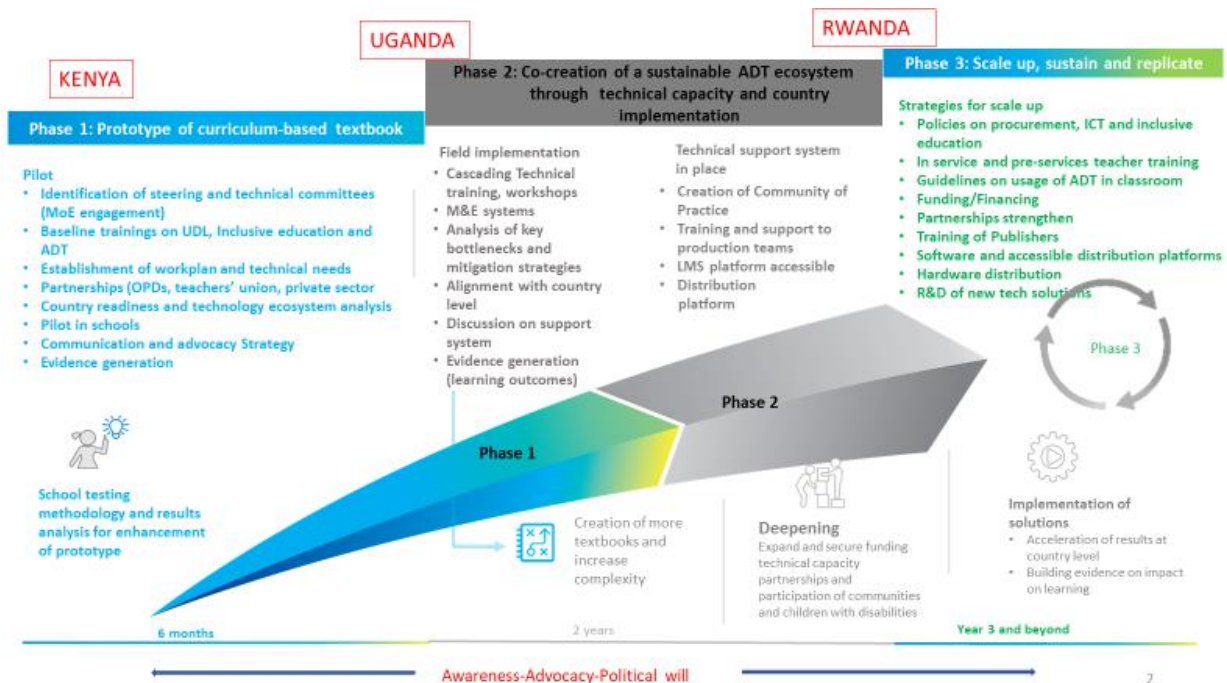
Experiences in countries show that the ADT initiative has stimulated conversations and engagement towards inclusive education and supported actions in terms of capacity building, system strengthening and policy making. The ADT initiative seems to be very attractive to MOEs because they see in the innovation a concrete way to respond to the needs of learning of children with disabilities, especially after the sad realisation that this population has been largely excluded from remote learning during the pandemic, as one of the ministry officials remarked *"covid-19 revealed the need for ADT because all learners would be able to comprehend the material, but sadly many children do not have access to tablets and computers outside of school, more so children with disabilities"*.

Keeping in mind the objective of promoting **sustainable change**, the review of this regional pilot highlighted some systematic changes that were realised and/or needed to be stimulated to ensure that regional investments and learnings are captured and scaled. The timeline for acceleration presented below describes the three (3) phases of implementation of the initiative from the piloting phase to

scaling up and sustainability phase, going through a deepening phase of institutionalization of the initiative in country. In fact, because of the lack of knowledge generation on this innovation, all countries have concentrated their efforts between the piloting phase (by creating ADT prototypes, building partnerships, and training of the TWG) and the scaling phase (by developing guidelines and strengthening policies). Therefore, the project design had considered these critical components to ensure that children with disabilities have rapid access to accessible learning materials together with the priorities of both agencies. With hindsight, it seems that the middle but central phase of co-creation of a sustainable ecosystem through the analysis of key bottlenecks of implementation, the alignment with country level and capacity, discussion on support systems and technical support needed to be deepened to enable a sustainable change.

Using this timeline, the analysis reveals that Kenya is still in the piloting phase having produced a few ADTs that are available to children with disabilities through the Kenya Cloud, but with no clear plan to maintain the initiative; that Uganda, in collaboration with the Policy Board, is entering the second phase on strengthening capacity and country implementation by producing more textbooks and training more teachers; whereas Rwanda is entering the scaling phase with a plan to adapt all primary and secondary textbooks and is currently producing 55 ADTs following UDL principles and have been steadily training teachers on UDL content and pre-service designers on ADT design. They have also formalized a Policy Board to support inclusive education and ADT related activities on top of securing funding from the World Bank to support scaling the initiative.

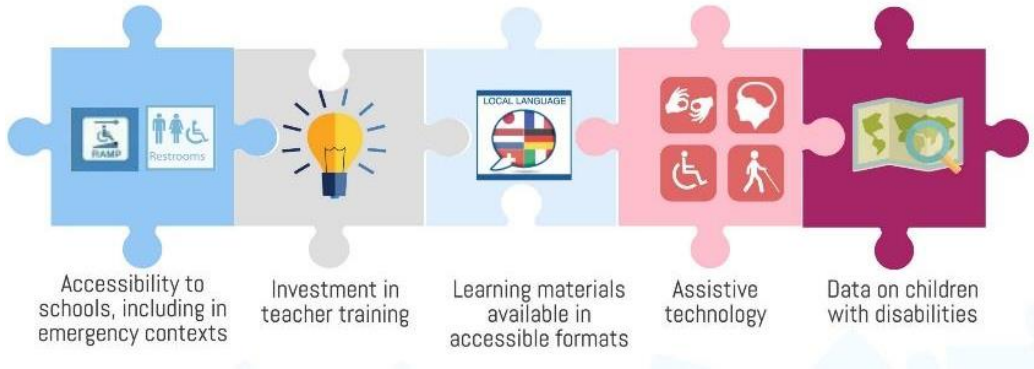
Figure 5: Timeline of acceleration of the ADT initiative



Through the current funding (UNPRPD-MPTF), the project was focusing on the enhancement of the enabling environment for the use of quality accessible digital textbooks to ensure and strengthen inclusive education and access to information by key stakeholders; and on improving capacity of the education system and the textbook ecosystem to produce and procure accessible digital textbooks. These objectives were met but the next steps require a focus on deepening and expanding technical capacity, partnerships and participation of communities and children with disabilities to really institutionalise the project within the inclusive education agenda of each ministry.

Finally, not only has the ADT initiative stimulated the local publishing market, but it has participated in filling an important gap in the inclusive education ecosystem to achieve quality education for all, as presented in the infographic below. The UNPRPD funding has allowed both agencies to work beyond the initial focus on “learning materials available in accessible formats” and the overarching component of inclusive education policies to include activities related to “investment in teacher training on inclusion” by including capacity building of teachers and stakeholders on UDL, ADT and disability rights, as well as procurement of “assistive technology” through the project in Uganda. Lessons learned have highlighted the importance to redouble our efforts to support teachers in incorporating the ADTs in their lessons to really foster inclusion and participation of all children. They have also accentuated the need for better evidence generation and data collection on learning outcomes of children with disabilities. Overall, the holistic approach of the ADT initiative has influenced the transition towards an education system inclusive to all children and efforts should be sustained.

Figure 6: Ecosystem to achieve inclusive education for all



This innovative inclusive solution from the UNPRPD funding has been a vector for Kenya, Rwanda and Uganda to address the barriers to learning for children with and without disabilities. All three countries have made significant efforts and are progressing toward inclusive education that facilitates learning for all.

6. Key Recommendations for diverse stakeholders

The recommendations below aim to guide each stakeholder group to effectively contribute to building a resilient ADT ecosystem. To meet the SDG 4 and leave no child behind in learning, the ADT initiative offers a unique opportunity to address the learning deficit whilst contributing to progressive realization of inclusive education.

Ministry of education:

1. Before implementation, together with Ministry of ICT, disability focal points within ministries and MOE, conduct a country assessment using the *Country Readiness questionnaire* and the *Technology Ecosystem questionnaire* which will allow for a deep analysis of local gaps and leverages to ensure success and sustainability of the ADT initiative. Plan budgets and targets accordingly.
2. Ensure the institutionalization of the ADT production following UDL principles within the ministry of education by including in the Education Sector Plan and promoting policies on procurement of curriculum-based textbooks requiring that all textbooks be produced following the ADT guidelines alongside printed versions, with the long-term goal to develop born-accessible textbooks.
3. Establish an internal multidisciplinary ADT technical group to facilitate the uptake of ADT production in the ministry and a Steering Committee to provide oversight and guidance with regular meetings between them to initially agree on performance indicators and targets and these monitored over time.
4. Ensure systematic documentation and enhance the knowledge management platform to build continuous learnings from the ADT experience.
5. Ensure skilled education workforce, including teachers with disabilities are trained through pre and in-service to comprehend UDL and can teach using the ADT for all children.
6. Collect data on usage of ADT by all children, with desegregation by disability; and on learning outcomes of children with disabilities using the ADTs.
7. Provide open access to ADTs produced on an accessible learning platform.
8. When available, allow for all children to use hardware in classrooms, including children with disabilities.

Ministry of ICT:

1. Advocate for and develop policies that support accessible ICT to leave no one behind.
2. Ensure that OPDs are among key stakeholder groups consulted during policy formulation/review processes.
3. Provide guidelines on government ICT procurement, in cognizance of the Marrakesh Treaty to ensure PwD's right to access to information is not violated.
4. Ensure information is available in accessible format in public libraries and reading spaces.
5. In collaboration with the Ministry that houses issues of PwD, undertake consultations including OPDs to develop action plans to operationalise the Marrakesh Treaty.

Ministry of Social Welfare (or whichever houses Persons with disabilities (PWD) issues):

1. In collaboration with ICT and MOE, ensure policies that relate to access to information for PwD includes AT.
2. Develop policy that stipulates the inclusion of OPD in national technology working groups to ensure PwDs voices are incorporated in ICT developments in all sectors particularly in education.

Technology developers:

1. Continue research and development of open-source accessibility technologies to ensure access for children with disabilities in low- and middle-income countries.
2. Work with OPDs to develop and validate new technologies.
3. Support trainings of in-service and pre-service technology developers to understand and apply UDL principles into technologies.

Publishers:

1. Raise awareness among publisher's associations and networks by providing trainings and information sessions on the ADT highlighting the importance of creating born-accessible content in all digital publications following UDL principles.
2. Adopt the ADT guidelines to create UDL content.
3. Create curriculum-based textbooks in Epub3 formats with accessible content.
4. Collect data on usage of ADT by all children, with disaggregation by disability and sex.

Organisations of Persons with Disabilities:

1. Engage with MOE and stakeholders to advocate for the right to inclusive education and access to inclusive, equitable and quality learning materials.
2. OPDs are key stakeholders and must be have representatives in the TWG. OPDs must be involved in all phases of the ADT ecosystem.
3. OPDs must be members of the teams involved in development of communication and advocacy strategies. They must be members of the communication and advocacy teams that will be involved in the operationalization of these strategies.
4. Provide information to families (in accessible formats) regarding the importance of access to education and access to quality inclusive education.
5. Facilitate dialogues between the MOE and families of children with disabilities to improve disability awareness and access to quality inclusive education through usage of ADTs in schools and at home.
6. Identify key experts to participate in all steps of implementation, from project design to monitoring and validation.
7. Lobby for and participate in Marrakesh Treaty consultations to ensure its operationalization and monitor its implementation.

Head teachers/Teachers:

1. Utilise communication channels of teachers' union and district education management to advocate for stronger and continuous digital literacy trainings and capacity building to teach children of different abilities in inclusive settings.
2. Adopt usage of ADT into classroom with all children to accompany daily lessons.
3. Promote training for all teachers to avoid knowledge and skills imparted to only a small group of teachers.

Families and users:

1. Support education of children with disabilities within inclusive settings and empower children to use and learn through digital tools.
2. Advocate for inclusive education and access to digital inclusive learning materials.

UNESCO:

1. Continue raising awareness by enabling new policies and Marrakesh treaty signatories.
2. Ensure training of disability rights and inclusive education to UNESCO staff and partners.
3. Mobilise funding to support the ADT initiative as part of inclusive education programming.
4. Ensure regional coordination of the initiative by allocating funding to hire a dedicated coordinator.

UNICEF:

1. Support and enable ADT community of practice and create an active task team to support easy deployment of expertise.
2. Leverage partnerships and regional networks to sustain the ADT initiative.
3. Mobilise resources to support the ADT initiative into inclusive education programming.
4. Ensure training of disability rights and inclusive education to UNICEF staff and partners.
5. Support MOEs with assistive technologies, hardware and software procurement for education of all children.
6. Ensure regional coordination of the initiative by allocating funding to hire a dedicated coordinator.

Donors:

1. Include access to ADT following UDL principles in all education-related tenders to ensure continuity of funding and scale of initiative.
2. Support multi-agency funding to ensure complementarity of efforts towards the holistic implementation and scale of the ADT initiative.
3. Maintain funding sources to implementing countries to ensure a more comprehensive implementation of the initiative and avoid gaps. This initiative targets long-term and profound systemic changes that need to be sustained throughout a long period of time to be successful.

Annex 1 Key informants

Kenya:

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Fridah, Kiambati, Lecturer, Kenya Institute of Special Education (KISE)
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Annex 2 Recommendations for the revision of the UNICEF *Lessons Learned guidelines*

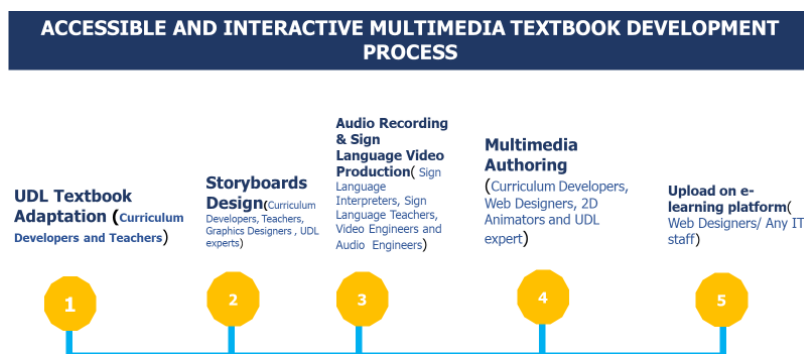
In 2019, UNICEF Disability Section, Programme Division, published the [Lessons Learned: Accessible Digital Textbooks using Universal Design for Learning for learners with and without Disabilities](#), intended for ministries of education, publishers, technology and content developers, teachers and implementers. This document was developed to share emerging lessons on the design and implementation of the UNICEF Accessible Digital Textbooks for All (ADT) initiative. It was prepared in a participatory manner with support, input and contributions from various partners and stakeholders. To this day, over 7 countries¹¹ have implemented the initiative following these guidelines but newly analysed emerging lessons from the UNPRPD Multi-Partner Trust Fund should inform modifications. Below are the recommendations for the revision of these guidelines:

- 1. Purpose of the ADT initiative:** The guidelines state the goal of improving immediate access to textbooks within the inclusive education framework but could amplify the role of the initiative as a catalyst of the paradigm change from special education to inclusive education.
- 2. Methodology:** Feedbacks from the field have shown that the methodology should include more details at certain steps.

For the **Pre-production phase**, we recommend completing the **Country readiness questionnaire** and the **Technology ecosystem questionnaire** from the beginning of the project to analyse the gaps and leverages existing in the country. This analysis will allow the MOE and stakeholders to identify local capacities and level of support needed from UNICEF and UNESCO.

For the **Production Phase**, the process, with recommended capacity, should be the following:

Figure 2: Accessible and interactive multimedia textbook developments process



¹¹ Kenya, Rwanda and Uganda; Jamaica, Nicaragua, Uruguay and Paraguay

- a. Include a *Content Validation Checklist* that presents the diverse accessible components following UDL principles that should be included in the textbooks to validate the quality of the content.

Example from Rwanda:

CHECKLIST TO GUIDE THE REVIEW/VALIDATION OF UDL ADAPTATION TEMPLATES			
Subject Name:.....		Reviewer's Name:.....	
Grade:.....			
Date:.....			
Main Target: Content to be appropriately adapted to meet learning needs of students with disability			
IMAGE DESCRIPTION			
1	The image description is age-appropriate		
2	The image description shows what is going on the image		
3	The image description focuses on learning objectives only		
4	The image description is simple and easy to read		
5	The images description with dialogues inside have image captions developed		
6	Image captions are well written as per the "standard syntax"		
7	The image description is done for non-integrated/separate images only		
TEXT ADAPTATION		YES(✓)	NO(X)
8	Words like "look", "see", "observe" etc are well adapted at the students' level		Ref.Slide
9	The instructions are well adapted		
10	The Unit activities/assessment are well adapted		
INTERACTIVE TYPES		YES(✓)	NO(X)
11	The interactive types proposed are relevant to the activity		Ref.Slide
12	The activities are unique in terms of learning objective		
GLOSSARY		YES(✓)	NO(X)
13	The new words used in image descriptions are added in the Glossary		Ref.Slide
14	The new words in the text are added in the glossary		

- b. Include a *Storyboard Content Template* to guide the technical team when producing the content adaptations.

Example:

Page	Content	Adaptation content	Image description/audio track	Exercise	Glossary	SL video	Other
p.[#]	Exercise [#]	Change sentence to: [Insert new sentence]	[simple, clear, level adapted]	[choose from template]	[new concept + definition + image+ SL]	Yes/No	

- c. Include clear steps of *Storyboard Design*, which are:
- i. Define template text vs exercises
 - ii. Define colors per type of content and background
 - iii. Define icons for navigation and identification of type of content
 - iv. Define where SL video will be positioned
 - v. Define navigation bar and symbols
 - vi. Define images for each page
 - vii. Design book template and send for validation to Steering and technical team

3. Include a *Validation Checklist* of the storyboard design following UDL principles to facilitate the validation of the design.

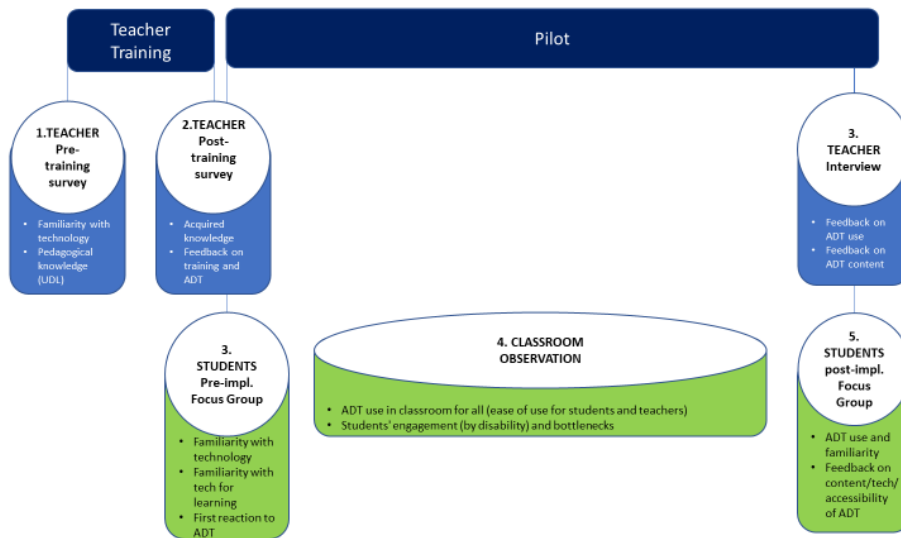
Example from Rwanda:

CHECKLIST(Sample)

CRITERIA	YES/NO
Images and audios are used as visual input and outputs in interactive activities on this slide	
Designed interactive activity on this slide checks the memory of what has been covered previously.	
The audio is used on the draggable items where possible on this slide(to some interactivities).	
There is a feedback message for right answers and wrong answers on this slide.	
Message for wrong answer is in red colour(dark) and well positioned on this slide. Should be placed slightly below the instruction title.	
There is an appropriate colour code on this slide. Color concept to be agreed	
The design layout of this page is consistent with other slides.	

4. **Pilot phase:** An important gap was identified in the pilot phase regarding the need for a testing methodology. A clear methodology to learn from the ADT pilot so as to effectively scale up the project for all students and especially for students with disabilities was needed. To this end, we recommend using the newly developed methodology for LACR for all future implementation presented in Annex 3. The diagram below shows the instruments and timeline developed especially for the piloting phase. Instruments would need to be adapted to the context and trainings to conduct the data collection and analysis are necessary to ensure quality and validity:

Figure 2: Testing methodology for ADT pilot used in Latin America and the Caribbean



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5. **Post-Production phase:** When the guidelines were developed, the open-source technology used to produce the ADTs were not well defined and systematized. Since research and development of the project with accessible technologies combined with country experience have resulted in clear recommendations for technology. The Epub3 format is currently providing the most seamless experience for the users, but as mentioned in the ecosystem section above, the analysis the whole technology ecosystem (from production to implementation) should be done prior to the implementation to cater the ADT to local realities. More technology recommendations are available on the www.accessibletextbooksforall.org initiative website under the 'Resources' tab.
6. **Communication strategy:** The addition of a communication and advocacy strategy would strengthen adoption of and engagement for the ADT initiative by all stakeholders and the community as a concrete tool for inclusive education. The communication strategy should present an evidence-based narrative of the transition from special education to inclusive education supported by the implementation of the ADT initiative, with clear messages to each targeted group.
7. **User guide:** The user guide should include strategies and tips to support the integration of the ADT adhering to UDL principles into classroom lessons in inclusive settings. Trainings for teachers should complement the user guide.
8. **Lessons learned from ESAR:** Lessons learned should be included in an edited version to inform interested countries.

Annex 3 Evidence Generation

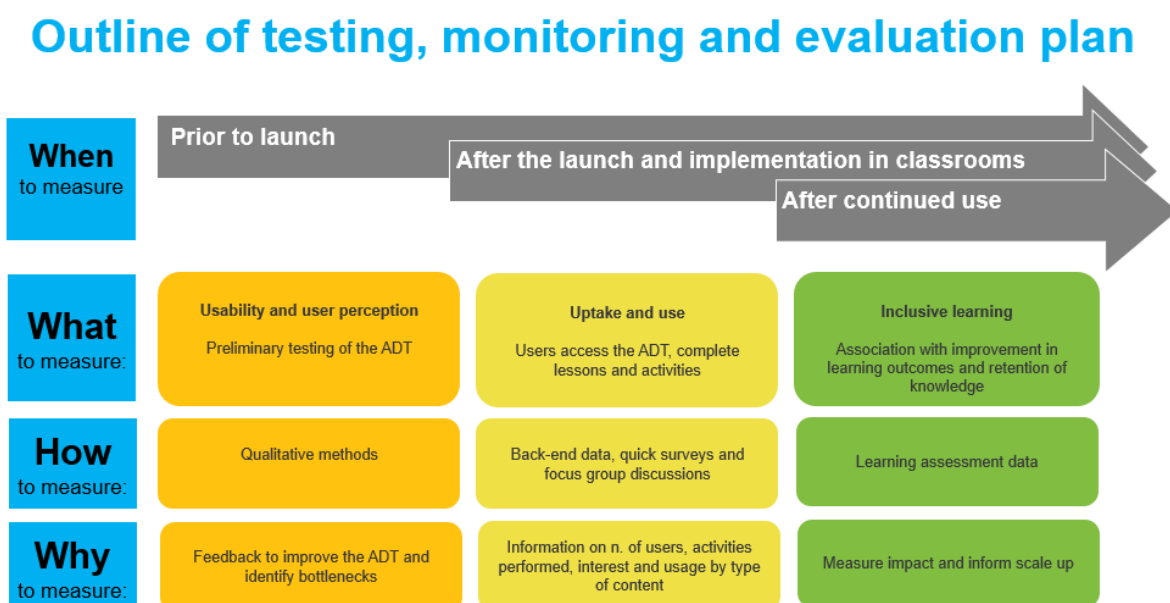
Since 2021, the Office of Research – Innocenti is collaborating with UNICEF COs and partners implementing the Accessible Digital Textbook for all (ADT) initiative in the Latin America and the Caribbean (LAC) and Eastern and Southern Africa (ESA) regions. The goal of this engagement is to generate evidence on the impact of the ADT initiative on learning at country level, and to identify and document the key steps and necessary conditions to effectively deliver and scale up the programme. This evidence generation process would include the development of key indicators, data collection protocols, and regular feedback loops to track outcomes and improve the programme over time.

As the programme pilots are underway in LAC and the programme continues to expand, there is an urgent need to understand:

- 1) the impacts of the programme on learning outcomes and inclusion for children with disabilities
- 2) how the ADP programme can be developed for sustainability, effectiveness, and scale.

The proposed evidence generation and action research are focused on usability and improvement of programme implementation and contribute to inform the scale-up phase of the initiative. This process will also lead to the enrichment of the UNICEF Global Disability Research and the global evidence base on ICT for education and learning for children with disabilities, with research that systematically presents findings from a series of implementation efforts across various contexts in Latin America and the Caribbean and Eastern and Southern Africa. The research will aim to inform inclusive education strategies at system level through mechanisms such as Education Sector Plans, following volume 3 of the methodical guidelines for education sector analysis (ESA).

Figure 1: Outline of testing, monitoring and evaluation plan from LACR.



Annex 4 Results and impact

Two outputs were defined to cover the joint activities conducted by UNESCO and UNICEF and enabled successful outcomes in each of the three countries over the course of 3 years of implementation (2019-2022).

Output 1: Enhancing the enabling environment for the use of quality accessible digital textbooks to ensure and strengthen inclusive education and access to information by key stakeholders.

The outcomes of the project that are consistent with the problem being addressed by the project are, for all 3 countries:

- Policies for Inclusive ICTs in Education for Persons with Disabilities approved, revised and/or implemented.
- Marrakesh Treaty Consultations and Ratification. Rwanda signed the Marrakesh Treaty in 2020 with support from this project.
- Partnerships for results with OPDs, private sector and public sectors to pursue advocacy leverage.
- Resolution on local sign language usage in accessible learning materials (Regional/multi-country).
- Awareness raised with teachers' union leaders, selected mainstream and special school teachers and head teachers on implementation of policy (with C4D).
- Guidance document on standards for local sign language usage in accessible learning materials for ECE and early primary levels.
- Facilitator's manuals for training of teachers on assistive technologies and adaptation of ADT developed.
- ICT equipment procurement guidelines for OPDs and key government stakeholders developed.
- Rwanda: Policy Board and Management Committee composed of UN agencies, Organisations of Persons with Disabilities (OPDs), key government stakeholders including teachers and information professionals and publishing companies established.

Output 2: Improving capacity of the education system and the textbook ecosystem to produce and procure accessible digital textbooks.

The outcomes of the project that are consistent with the problem being addressed by the project were:

- ADTs were produced, tested, and validated with children with disabilities in all 3 countries:
 - Kenya has produced 2 ADTs (Environment and Nutrition). The UDL principles were partially integrated, which means that the textbooks include all accessible formats but are presented in 3 different strands through media overlays- one textbook with audio features for learners with visual impairments, one textbook with Kenyan Sign Language (KSL) interpretation for deaf learners, and another textbook for learners with intellectual disabilities. The focus is still disability related instead of a tool for all children.

- Uganda has produced, in phase 1 of the project under another UNPRPD funding, 2 ADTs that are disability-specific (one for Blind/Visually impaired, and another for Deaf/Hard of Hearing) for Primary 4 and 6 children.
- Rwanda has produced 1 ADT P1 English following UDL principles and UNICEF Guidelines.
- ADTs are currently available to children on the Kenya Education Cloud, REB platform in Rwanda and on the Colibri platform in Uganda;
- Guidelines for the use of interactive accessible digital content were produced, distributed to schools, and used by teachers;
- More than 300 teachers were trained on the use of interactive digital textbooks in teaching and adapting content for improving learning outcomes;
- Guidance to promote Easy-to-Read features into ADT for children with intellectual disabilities were produced in Kenya.

Impact beyond the production of ADT

- ESAR is the first region to have engaged in a global ‘movement’ towards the use of accessible digital textbooks (ADT) in support of national efforts on inclusive education.
- Global acknowledgement of advocacy and convening role played by UNICEF and UNESCO has influenced donors who are now including ADT in their tenders and policies on procurement of textbooks and learning materials.
- There is a recognition of the initiative by the main actors and donors in the field of accessible technology for education and for early reading & learning (Global Book Alliance/ Global Digital Library/WIPO/USAID/DFID/NORAD/EdTech/GPE).
- All 3 countries have generated country case studies and knowledge pieces for the Global Portal on Accessible Digital Textbooks created to promote knowledge sharing and support to countries on production of ADT for inclusive education and can be found here: www.accessibletextbooksforall.org
- Lessons learned from implementation in countries have supported the enhancement of the ADT initiative in terms of clearer understanding of the necessary ecosystem, processes, resources, methodology and funding required to support its implementation and scale in countries.
- The lessons shared from regional and global communities of practice working collaboratively on the sustainability of ADT ecosystem have created South-South cooperation systems for the sustainability of the initiative, mainly between ESAR and LACR.
- The expansion of the ecosystem to produce ADTs in all 3 countries includes new local partnerships, OPD engagement, trained MOE technical teams and contracts with local providers. There are signs of new local market shaping for the production of ADTs.
- This project has participated in the improved capacity of officials of ministries of education, publishers, curriculum developers and teachers to create accessible digital content. Learnings from implementation in the 3 countries have supported the definition of the type of trainings and technical support each stakeholder need to fully participate and benefit from them.
- Parents/caretakers are starting to be aware of their rights to access inclusive education through quality accessible educational content.

- Policy makers are more aware of the right of children with disabilities to access education using curriculum-based learning materials. They are working towards including specific accessible requirements in their existing policies and amendments to include ADT.

Comparative Matrix

Activity/Country	Kenya	Uganda	Rwanda
Steering Committee and Technical Working Group	Technical Working Group but no Steering Committee	Both Steering Committee and Technical Working Group	Both Steering Committee and Technical Working Group
Technology development	KICD/KISE in collaboration with private sector	MOE and University	In-house Rwanda Education Board
ADT produced	2	2	1
UDL content	Not fully integrated. 3 strands disability-related (media overlay)	Separated content for Blind/low vision and deaf/hard of hearing	UDL integrated into one textbook
Trainings	ADT production, UDL, teacher training, EPub3	ADT usage (teachers, head of schools), ICT	UDL content, UDL storyboard, teacher usage, ICT
Pilots in schools w informed methodology	20 schools	20 schools	10 schools
Distribution	Kenya Education Cloud	Colibri platform	REB platform
ADT planned	None	2	55

Annex 5 List of documents produced under the UNPRPD joint programme

- Accessible Digital Textbooks using Universal Design for Learning for learners with and without disabilities: Emerging lessons to guide and support ministries of education, publishers, technology and content developers, teachers and implementers. UNICEF (November 2019)
- An Audit of Inclusive ICTs for Education in Uganda under the UNPRPD Project In Uganda: Final Draft. Uganda Technology and Management University (Utamu) (October 2015)
- Consultative Meeting Report on the Ratified Marrakesh Treaty in Rwanda, 11 – 13 August 2021, UNESCO, MINEDUC, Rwanda National Commission for UNESCO, UNICEF
- Good Practices documented by UNICEF in March 2021
 - Kenya: ADT Multi-stakeholder Technical Working Group
 - Rwanda: Using National Events to Advocate for Accessible Digital Textbooks: National Literacy Month Event held on Monday October 19th, 2020
 - Uganda: Monitoring the use of ADT in inclusive primary schools.
- Guidelines On Procurement of ICT Equipment for Persons with Disabilities in Rwanda Kigali. UNESCO December 2021
- How Much Does Universal Digital Learning Cost? A Policy Brief. UNICEF Innocenti 2021
- Marrakesh Treaty Report on National Consultations in Kenya. Kenya Institute of Curriculum Development. Nov 2021
- National Consultations on the Ratified Marrakesh Treaty in Uganda: Final Report October 5, 2021
- National ICT Policy for Persons with Disability, Final Draft. Uganda Ministry of Information, Communications Technology and National Guidance. (February 2018)
- Promoting Inclusive Education Through Holistic ICT Integration: Special Needs Education Early Years of Education Teacher Training; Assistive Technology, Interactive Accessible Digital Textbooks, and Content Adaptation: Facilitator’s Guidelines (UNESCO, undated)
- Sensitization and Training Workshop on the Use of ICTs by PwDs in Uganda for DPOs, CSOs and Programme Officers of Relevant MDAs, at the Information Access Centre (IAC), Ministry of ICT & National Guidance: 2nd draft Workshop Report. Uganda (4th July 2018)
- Sign Language for Deaf Children’s Education and Guidance on its Use in Accessible Digital Teaching & Learning Materials. UNICEF. September 2021
- UNPRPD End of Project Report, Uganda. 2017
- UNPRPD Promoting inclusive education through accessible digital textbooks in Kenya, Rwanda and Uganda. Multicounty Project Proposal, UNICEF and UNESCO. (approved on 2018)
- UNPRPD Promoting inclusive education through accessible digital textbooks in Kenya, Rwanda and Uganda. Annual Progress Report July 2019 to February 2020
- UNPRPD Promoting inclusive education through accessible digital textbooks in Kenya, Rwanda and Uganda. Annual Progress Report March 2020 to February 2021
- UNPRPD Promoting inclusive education through accessible digital textbooks in Kenya, Rwanda and Uganda. End of Project Report June 2019 - April 2022
- <https://www.accessibletextbooksforall.org/accessible-digital-textbooks-all-initiative>