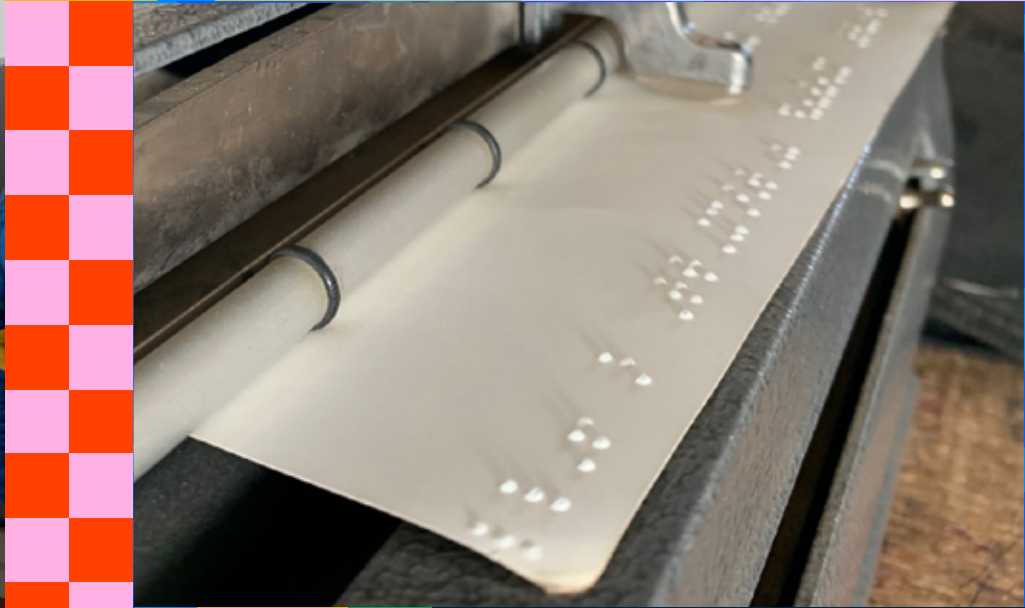
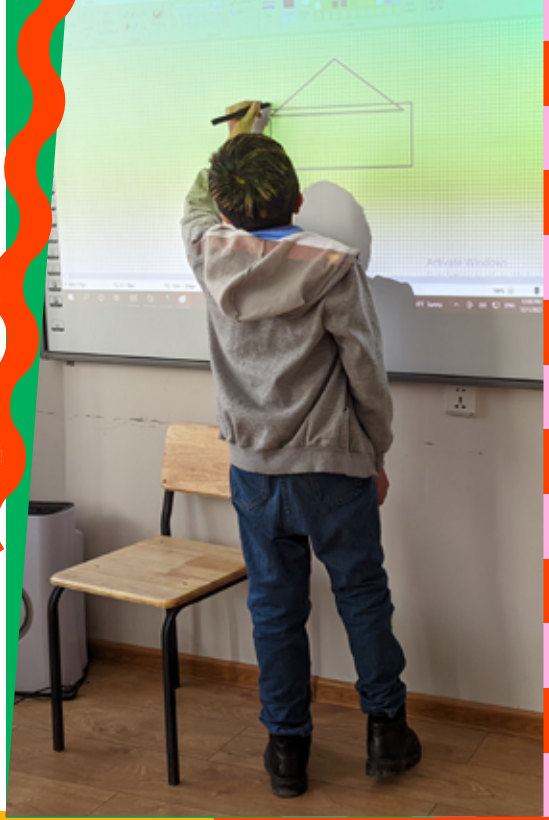


Costing a Tech-Enabled Disability Inclusive Education (TEDDIE) Intervention

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+ TEDDIE Operational Toolkit

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WHAT is TEDDIE?

Tech-EnableD Disability Inclusive Education (TEDDIE) is an instrument comprising a costing tool and an implementation toolkit to help policy makers estimate the cost of procuring, utilizing, and maintaining an intervention that leverages technology to support learners with disabilities.

A **TEDDIE instrument** refers to all TEDDIE-related products, including a costing tool and implementation toolkit. Using a TEDDIE instrument requires an inclusive EdTech intervention to implement at the national, regional, local, or school level. An effective use of TEDDIE involves designing the selected intervention and working with government focal points to use the available information and data sources to cost out that intervention.

The **TEDDIE costing tool** can be used to generate a report that can subsequently be used to inform inclusive education reform; implement a program; or prepare a project, law or policy draft, concept note or proposal for donors/funders, among others. The TEDDIE costing tool specifically refers to the Excel tool used to cost out a minimum package.

The **TEDDIE implementation toolkit** includes an intervention, minimum package, and case study/research. A **TEDDIE intervention** refers to the processes and pedagogies that are used to implement a minimum package, i.e., how those inputs are applied, used, monitored, and adapted over time (five years). The processes and pedagogies include mainstreaming inclusive education through the use of technology, equipping a subset of schools with inclusive technologies, increasing teachers' capacity to use and apply technologies, among others. A **TEDDIE minimum package** refers to key inputs and associated costs of a technological intervention, including materials and tools such as hardware and software, as well as human resources, such

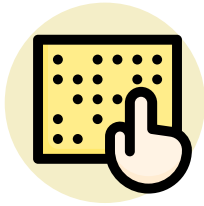
as teachers and teacher training, the costs of monitoring and evaluation, etc. **TEDDIE case study/research** refers to the process of applying the Excel tool in a country, which involves conducting primary research in that specific context and drawing upon the lessons learned.

WHY is TEDDIE needed?

TEDDIE was introduced as part of the recommendations of *Landscape Review of ICT for Disability-Inclusive Education (World Bank 2022)* which identified the need to develop a tool to help countries consider the availability and costs of accessible EdTech and assistive devices to support reasonable accommodations for learners with disabilities. The review presents a 6Ps framework in which technology functions within a broad system of factors to enable a sustainable impact on education at scale. The 6Ps framework includes the following: people (the users and implementers), product (the device, hardware, or software being used), pedagogy (how the technology is used to maximize learning), place (where the intervention will occur), provision (funding and support for the intervention), and policy (the government stance in relation to the intervention).

TEDDIE can be used to accompany and support policy processes on inclusive education; it provides initial answers to questions related to costs and financing, in the short and long term, of inclusive education and the required assistive technologies. Furthermore, TEDDIE supports policy makers in quantifying not only the costs of hardware, software, and devices but also the human capacity costs, such as teacher training, and the ongoing maintenance and replenishment of inclusive technologies that are vital for the effectiveness and sustainability of ICT and EdTech solutions ([World Bank 2022](#)).

HOW can TEDDIE be applied to different country contexts?



In countries with emerging inclusive education policies and developing assistive tech resources, the TEDDIE instrument can support efforts to provide a TEDDIE minimum package of key inputs and associated costs of a technological intervention. TEDDIE can also be considered for use to build capacity among policy makers, by offering major considerations, challenges, and tradeoffs when designing a technological intervention, or identifying priority areas for inclusive education and EdTech policies.



In countries with more established inclusive education policies and tech eco-systems, TEDDIE can strengthen existing efforts to improve current inclusive education policies, by focusing on training teachers; updating devices, hardware or software; or trialing more high-tech and innovative solutions; among other things. TEDDIE can also function to identify gaps for improvement and next steps.

WHAT are TEDDIE's capabilities?

Table 1. TEDDIE Capabilities

TEDDIE can...	TEDDIE cannot...
<ul style="list-style-type: none"> » Estimate the price of procuring and maintaining inclusive ICT (hardware, software, and human resources) for a specific intervention or program designed or co-designed by policy makers. » Provide a menu of options and costs of the inclusive ICT resources, from which policymakers can decide or agree upon a minimum package to carry out their intervention or program. These costs include, but are not limited to, EdTech tools, teacher (and other specialist) training and salaries if relevant, and costs of maintenance, repair, monitoring, and evaluation. » Provide information to estimate short-to medium-term costs to implement the intervention or program. » Become a tool that is frequently updated to reflect policy changes or intervention refinements or changes. It can also accompany processes of scaling up interventions. 	<ul style="list-style-type: none"> » Offer a prescriptive TEDDIE intervention to implement in a country. Each intervention must be tailor-made and shaped by the country's context, government priorities, local tech markets, and learner needs. » Collect or generate new data. The tool is informed by available data. » Provide an exhaustive menu of resources that can potentially support learners with disabilities. The options are endless, but this brief is designed to help stakeholders think through major considerations when trying to decide which hardware, software or <i>humanware</i> (people's capacities) to select. » Differentiate the cost benefits for learners with and without disabilities. Inevitably, all learners, including learners without disabilities, will benefit from having a more inclusive and tech-enabled environment.



WHO is TEDDIE for?

The TEDDIE instrument is aimed to support policy makers at Ministries of Education, Health, Social Protection, Finance, and Digital Development to plan for inclusive EdTech interventions. For example, relevant ministries and other government bodies, with the assistance of World Bank Task Team Leaders, can use the information provided by TEDDIE in their decision-making processes regarding inclusive education and the provision of EdTech including assistive technologies. TEDDIE can also be used by donors, other international organizations, nongovernmental organizations, civil society, and the private sector.

HOW can TEDDIE be piloted to meet the needs of a specific country?

There are three key steps to piloting TEDDIE to meet the needs of a specific country. The following includes descriptions and questions for each of the three steps. Addressing the accompanying key questions will help to contextualize and tailor the TEDDIE minimum package and intervention for a country's specific needs.

Step 1. Understand the country context

Effective use of TEDDIE within a specific country context depends on a detailed analysis of three key components: (a) policy environment, (b) data on learners with disabilities, and (c) the EdTech landscape.

The policy environment. How can a TEDDIE intervention be designed to support the government's current political agenda? What policies, laws or plans address EdTech in general, and for learners with disabilities in particular?

Garnering government support is vital to ensuring TEDDIE interventions are effectively implemented and sustained over time. Analyzing existing policies, plans, and priorities allows stakeholders to strategically align with and support national goals, identify entry points for integration, surface gaps to fill, coordinate stakeholders, and craft proposals that are politically and financially feasible. This policy-grounded approach helps ensure TEDDIE complements and strengthens the government's vision for inclusive, quality education.

In some countries, the government may already have a predesigned program, or other intervention that it wishes to cost out. In these cases, step 1 may include the need to become familiar with the design, tools, technologies, and human resources of the government, and to identify any gaps that may need further consideration.

Data on learners with disabilities. What data are available on learners with disabilities and how can this data inform the design of the TEDDIE intervention?

One of the principles of designing EdTech solutions depends on a user-centered and inclusive approach (World Bank 2020). For TEDDIE interventions, the end user is the individual student with a disability,

and a teacher or another adult who will help facilitate learning. Comprehensive data on learners with disabilities and their functional needs (according to the [Washington Group's questions](#)) are thus a critical ingredient for the development of a contextually relevant TEDDIE intervention. Learners with disabilities are not a homogeneous group; they have diverse support needs. For example, a country may have data on the number of learners with visual difficulties, but the data do not provide details about the number of learners who are fully blind and need access to screen readers or text-to-speech software, or the number of learners who have low vision and require prescription glasses, handheld magnifiers, or magnification software. Likewise, data may be incomplete regarding the diverse needs of learners with developmental or intellectual disabilities (e.g., autism and neurodiversity, print and reading difficulties such as dyslexia, dyscalculia, or dysgraphia). Detailed data may also be missing for learners with physical difficulties who are also a diverse group and may include learners with difficulty moving their lower limbs or those with fine motor difficulties in moving the upper limbs; data may be incomplete on the needs of these learners who may require different types of wheelchairs and walkers to get around the room, or devices to help them hold and grip technology for learning.

When data at the granular level for students are unavailable, it is recommended that stakeholders consider designing a minimum package for a different unit of measurement, such as a teacher, a classroom, or a school. Minimum packages can also be designed to equip a teacher training college, an inclusive education resource center, or any other facility where learners with disabilities may engage in teaching and learning processes. It is important that decisions are informed by the available data in any given context.

The EdTech landscape. How does the current EdTech ecosystem in a country facilitate the design of a TEDDIE intervention?

While technology can be a catalytic tool to support learning for all students, there exist large disparities in access to reliable electricity and the internet both across and within countries. Rural and remote regions may have unreliable internet connectivity, and therefore online digital solutions may not be a viable option. Initial diagnostics of the Edtech ecosystem of a country will help identify the sorts of technology that are feasible within a specific country's context. During this process, stakeholders should inventory the hardware and software used in schools (or other settings where learning takes place such as library, community center or similar), so that a minimum package can be designed to build on the available resources, and especially locally sourced resources, as long as these resources are of quality and deemed effective in the country context. Awareness of the current devices and the operating systems used in a country or region will help to ensure compatibility for a TEDDIE intervention. USAID's *Using ICT for Universal Design for Learning (UDL)* includes a comprehensive list of questions to consider when mapping the Edtech landscape or ecosystem ([Bane et al., 2020](#)).

While mapping the EdTech landscape, it is important to engage private sector actors, who may have a more nuanced understanding of the potential EdTech solutions in each country context. The private sector can be an invaluable enabler in ensuring that accessible, affordable, high-quality assistive technologies will reach and empower learners. Through research and development, local manufacturing, procurement assistance, widespread distribution even in remote areas, ongoing maintenance and technical support, innovative financing options, cross-sector partnerships, and overall market growth, private companies can

drive critical advancements. By innovating new technologies, producing devices locally, facilitating access, providing training, easing budget limitations, collaborating with government and civil society, and achieving economies of scale, the private sector multiplies opportunities to equip learners with the assistive technologies they need to thrive. Strong partnerships with the private sector are essential for EdTech adoption and impact and should thus be explored as stakeholders engage with TEDDIE.

Step 2. Design a TEDDIE minimum package

After step 1 has been completed, information and data can be used to design a tailored minimum package of resources (material and human) to support learners with disabilities through and with technology. Step 2 seeks to answer the following key question: **What are the minimum conditions to ensure all learners with disabilities have access to a quality tech-enabled environment?** To do this, further consideration could be given to the following issues:

What tech hardware or software is needed to ensure all students can access learning?

When designing a TEDDIE minimum package, it is important to consider what learners need, at a *minimum*, to access quality learning. If school enrollment and attendance data suggest that learners with disabilities are still not accessing schools, consider including the costs of accessible transportation, mobility devices, and/or communication campaigns (including through radio and television or other broadcast media). If teaching and learning processes are the priority, consider what hardware or software may be needed to enable inclusive learning. Consult the [ICT Directory for Inclusive Education](#) for a comprehensive repository of assistive devices and technologies and their associated costs. The directory can be

used as a springboard to explore additional or alternative options. Recommendations for selecting hardware and software in a minimum package include the following:

- Prioritize **high-quality locally sourced hardware or software** that can be easily maintained and repaired. If essential technology is not available locally, explore international market prices, with attention paid to the costs of shipping and importation fees.
- Ensure all hardware or software selected is **contextually appropriate** and available in national or local languages, including a national (local) sign language where relevant, and that any curriculum content (e.g., in mathematics, science, or literacy games and apps) are aligned with the national curriculum and teaching and learning standards.
- Prioritize the purchase of **low-cost software** in low-income countries, or where financial resources are limited. This might include apps for mobile devices which can **be downloaded and used offline** and installed across multiple schools and districts, rather than a tech tool that fulfills the same functions ([USAID 2020](#)).
- Consider **non-tech options**, especially manipulatives such as learning blocks, 3D shapes and geometry packages, cutout letters, or flashcards.

What are the “invisible” costs that must be considered to implement a TEDDIE intervention?







Technology alone does not suffice to ensure a TEDDIE intervention can function and maximize learning for all learners, including those with disabilities. A minimum package should include the additional human and material resources — or invisible costs — of making a TEDDIE intervention operate effectively. This includes the cost of training

teachers or other specialists, including staff time and any training materials, venues, or additional costs; transportation costs for delivering the hardware or software; and costs for monitoring and evaluating the TEDDIE intervention.

Table 2 summarizes the major cost considerations or “inputs” that a minimum package should include. These consist of digital devices, tools and hardware, including assistive technologies; software, platforms, and apps; non-tech teaching and learning materials, such as blocks, puzzles, and picture cards; reasonable accommodations, such as accessible

transportation/infrastructure, or communication campaigns; teacher and specialist training, including all staff time, training materials, venue costs, etc.; and maintenance costs, such as the cost of a technician, or replacement batteries and equipment. Table 2 displays certain categories, but the language used to describe the material and human resources included in a minimum package will need to be adapted to and aligned with each country context to ensure that they reflect the specific needs of a country’s end users, and that they are aligned with any other relevant policies or education sector plans that they accompany.

Table 2. Key Inputs of a Minimum Package

Input	Description
 <p>Digital devices, tools, and hardware</p>	<p>Hardware includes computers, tablets, mobile phones, smartphones, speakers, and projectors. Assistive technologies include wheelchairs, walkers/canes, eyeglasses, hearing aids, prosthetics, handheld magnifying glasses, digital recorders, vibrating wrist watches, e-readers, handheld scanners, alternative or adaptive keyboards, trackball mouse, pencil grips, smartboards, etc.</p>
 <p>Software, platforms, and apps</p>	<p>Pre-installed or ready to install software, apps or games include screen readers, text-to-speech software, voice recognition software, software to transcribe audio to text, magnification software, audio-to-text converters, alternative and augmentative communication (AAC) software, word prediction software, dyslexia or dyscalculia apps, or other apps and games that can support learning.</p>
 <p>Non-tech teaching and learning materials</p>	<p>Printed books or signs and manipulatives include blocks, puzzles, shapes, picture cards, flash cards, toys, mathematics and science kits, or other non-tech resources.</p>
 <p>Reasonable accommodations</p>	<p>Supports not mentioned in other categories include accessible transportation, accessible restrooms, wheelchair ramps, communication campaigns, etc.</p>
 <p>Teacher and specialist training</p>	<p>Training for teachers and specialists include teacher training materials/ curriculum, staff time (teachers, ad-hoc teachers, psychologists, sign language interpreters, other specialists, teacher trainers, etc.), per diems, transportation, accommodation, food, and training venues.</p>
 <p>Maintenance</p>	<p>Material and human resources needed to repair and maintain technology include technicians, replacement batteries, and equipment to (re) install equipment.</p>

Each TEDDIE minimum package will consist of must-haves, such as hardware, software, and *humanware* (people's capacities), that are essential for learners with disabilities to access, participate in, and benefit from teaching and learning processes. However, when designing a minimum package, stakeholders may also consider nice-to-haves, which include resources that could contribute to improving learning, if resources/finances allow.

Step 3. Use TEDDIE to cost out the TEDDIE minimum package.

The material and human resources that are part of a minimum package will each have an individual cost. The final step of the TEDDIE research involves inputting these costs into an adaptable TEDDIE costing tool. The TEDDIE tool consists of a framework aligned with the above considerations (steps 1 and 2), and stakeholders can select from an option of pre-installed items. They can also add their own items and their associated prices. The Excel tool is designed to cost out a five-year plan to implement a TEDDIE minimum package. To do this, two final considerations are needed, as described below.

What are the longitudinal costs for implementing a minimum package over the span of five years?

For a five-year intervention plan, three key data points or cost estimations should be considered: (a) the potential increase in student population over time, and how that may affect the scale of the TEDDIE intervention; (b) the cost of replacing faulty or repairing damaged equipment over time; and (3) inflation that causes the prices of resource to

change over time. The cost estimations can be made in close collaboration with the government, a finance or tech specialist who has contextual knowledge of local market prices, or a social inclusion specialist who can estimate national/local population trends. There may be other additional longitudinal costs that need to be considered and factored into the Excel tool to increase the accuracy of the cost estimations.

How can the TEDDIE tool be systematically integrated into government budget and planning mechanisms?

TEDDIE is designed to work within a broad system of factors; it should not be used as a stand-alone costing tool. To ensure its sustainability and applicability, TEDDIE can be systematically integrated into government budget and planning mechanisms. Tool outputs could be aligned with budget timelines by structuring TEDDIE cost estimates to match government budgeting cycles and deadlines. The tool could be linked to procurement systems, by including it into the government procurement processes to ensure suggested items are purchased. Annual sector plans could be provided by adding TEDDIE as a step in annual education sector planning exercises. Mechanisms to monitor system integration could be created by including built-in processes to monitor budget allocations and spending on TEDDIE recommendations. Training could take place to build the capacity of finance and education planners on using the tool to inform budgets. Sustainability factors could be assessed with consideration of long-term resource needs and local factors to ensure the sustainability of TEDDIE integration.

WHAT

What are the key considerations for implementing TEDDIE?

TEDDIE offers the potential to advance disability inclusion in educational technology procurement and maintenance. However, to ensure its effective and sustainable implementation, the following five critical considerations will need to be addressed:



Ensuring the availability and accuracy of quality data.

Quality data are essential for the effective implementation of TEDDIE. Comprehensive and granular data on learners with disabilities and school resources need to be regularly gathered, validated, and updated at the system level. This is crucial for TEDDIE to provide informed decision-making and tailored interventions.



Effectively integrating a systemwide plan.

TEDDIE supports prioritization at the system level. By providing a holistic framework, and by convening different stakeholders into decision-making processes, TEDDIE

can facilitate the identification of gaps and priorities within the education system and technology ecosystem.



Adding value to the existing national policies and priorities.

Alignment with national policies is critical. TEDDIE can help align priorities for tech-enabled inclusive education with existing national policies and strategies. This ensures interventions build on current efforts and fit the country context.



Adapting TEDDIE to suit each

intervention requires ongoing training, maintenance of tech, policy advocacy, evidence building, and coordination between government, civil society, and private sector. A long-term, collaborative approach is the key.



Taking measures to sustain the effort and impact of TEDDIE

over time. Sustained effort is needed. Successful TEDDIE intervention requires ongoing training, maintenance of tech, policy advocacy, evidence building, and coordination between government, civil society, and private sector. A long-term, collaborative approach is the key.

These five takeaways highlight crucial factors for budgeting and implementing tech-enabled solutions for disability inclusion. **TEDDIE can be a valuable tool to foster an inclusive and accessible education system for all learners with disabilities.** However, achieving this vision demands concerted efforts from governments, civil

society, and the private sector, reinforcing the importance of commitment and collaboration in this endeavor. By addressing the concerns raised in these five key considerations, the potential of TEDDIE to empower learners with disabilities with the transformative benefits of educational technology can be fully realized.

Let's Shape an Inclusive Future Together with TEDDIE!

Contact us at inclusive_education@worldbank.org for inquiries, collaboration opportunities, and follow-up. Scan the QR codes to know more.



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