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# Data collection and visualisation tools in the education sector in sub-Saharan Africa and South Asia

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## Reviewer

Caitlin Moss Coflan

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# Abbreviations and acronyms

<b>CSV</b>	Comma separated value	<b>PAL</b>	People's Actions for Learning
<b>CWTL</b>	Can't Wait to Learn	<b>PBO</b>	Public Benefit Corporation
<b>EGMA</b>	Early Grade Mathematics Assessment	<b>SA</b>	South Asia
<b>EGRA</b>	Early Grade Reading Assessment	<b>SEND</b>	Special educational needs and disability
<b>EYPP</b>	Early Years Pre-School Program	<b>SSA</b>	Sub-Saharan Africa
<b>FLN</b>	Foundational Literacy and Numeracy	<b>SSL</b>	Secure Sockets Layer
<b>IDELA</b>	International Development and Early Learning Assessment		
<b>IRC</b>	International Rescue Committee		
<b>IVR</b>	Interactive Voice Response		
<b>LMIC</b>	Low- and middle-income country		
<b>LWL</b>	Leh Wi Lan		
<b>MBSSE</b>	Ministry of Basic and Senior Secondary Education		
<b>NGO</b>	Non-governmental organisation		

## Purpose

In this report, we aim to explore digital tools that allow for cost-effective, adaptable, usable, timely, and reliable data collection and visualisation to inform decision-making. Digital data collection and visualisation tools have proven to yield reliable results, facilitate inclusion of ethnic and language minority groups as well as students with special educational needs and disabilities (SEND). Such tools can save organisations time and resources during the data collection and visualisation process, minimise errors during data collection, and help to easily share results and collaborate, often without the need for advanced technical expertise.

To develop this resource, a market landscape analysis was developed to identify potential tools. From over 50 tools, four were explored in depth to understand how they were used and adapted to different contexts in sub-Saharan Africa and South Asia. These case studies allow us to evidence the adaptability of the tools to different research needs and highlight the challenges in those implementations.

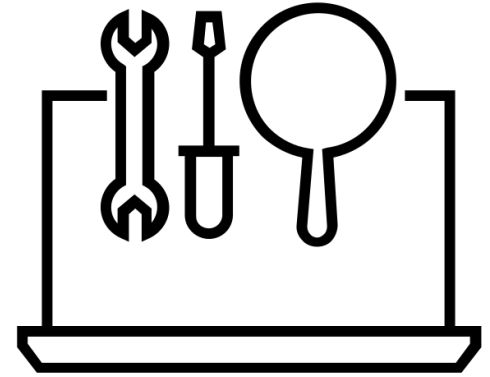
# Contents

1. Market landscape
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  - c. Other relevant FLN assessments
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  - c. Turn.io
  - d. ODK
5. Key takeaways
  - a. What have we learnt?
  - b. Market gaps

# Market landscape

# Data collection and visualisation tools

- 50+ data collection and visualisation tools were identified through a web search under the following inclusion criteria:
  - Used in sub-Saharan Africa (SSA) or South Asia (SA)
  - Could be used in this context even if there is no recorded evidence of its use there
  - Yields consistent results
  - Validated by non-governmental organisations (NGOs) or government agencies
  - Allows for data collection and visualisation, even if it is not its main objective
  - Matches at least one of these six characteristics: reliability, timeliness, informs decision-making, adaptability, cost-effectiveness, and usability.
- There is recorded evidence of use in SSA and SA of at least 27 of these tools.
- For the paid-for tools, the average monthly price is USD 149, the lowest being USD 20, the highest USD 499, and the most common cost USD 25.





## Overview of the data



**22**

Tools are free



**16**

Tools are free  
and open source



**37**

Tools can be  
used offline



**36**

Tools offer  
multi-language  
support

# Navigating the landscape analysis

This slide includes a link to a spreadsheet with details about the tools investigated as part of our landscape analysis.

In the **first sheet**, you will see a **detailed view** that includes the following information for each tool:

- A description of the tool
- The sector where it has been predominantly used
- How the data is collected and visualised
- If it offers language support and in which languages
- Regions where it has been used (particularly relevant for lesser-known tools)
- If it is paid-for or free and the price
- If it offers an offline option
- If it offers tech support
- If it is open source
- If it offers the possibility of visualising the data live
- Link(s) for more information

In the **second sheet**, you will be able to apply filters in a **summarised view** for a customisable search. For instance, you can use this sheet to search for tools that are both free and offline. The characteristics that you can see are:

- Description
- Cost
- Tech support offered
- Language support
- Open-source status
- Region
- Possibility of visualising data live

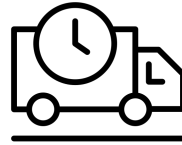
Spreadsheet available [here](#).

# Characteristics of a high-quality tool

## Six characteristics of high-quality data collection and visualisation tools



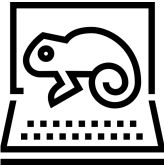
**Reliability**



**Timeliness**



**Inform decision-making**



**Adaptability**



**Cost-effectiveness**



**Usability**

# Reliability

Reliability relates to a tool's trustworthiness and ability to deliver consistent results. These include:



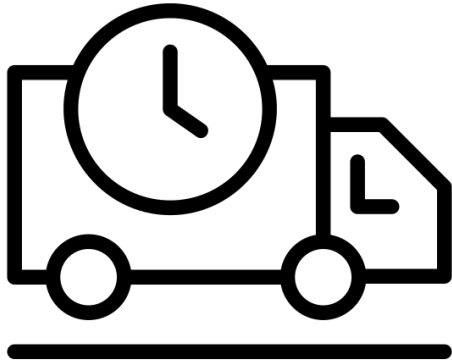
- The tool's capacity to yield reliable data
- Human capacity to use the tool's full potential
  - Tool's user-friendliness
  - Skills required to use the tool
- The tool being validated in a particular context

For example, **Mobenzi\*** has been successfully used in a relevant national (social and economical) context, accepts different types of input data, and verifies the time and location of the data collected

\* See <https://www.facebook.com/mobenzi/> Retrieved 10 April 2024

## Timeliness

Timeliness relates to the data being available when needed for decision-making and accurately representing what is happening at that moment, and the tool's potential to provide live results. The data is up to date.



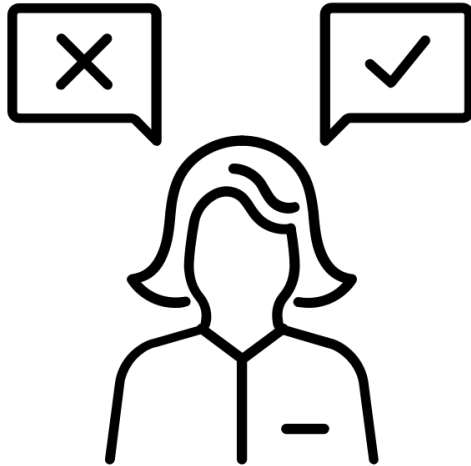
Live visualisations require the data collection tool to be connected to the visualisation tool and allow for analysis at any moment. For instance, this could be helpful when providing daily reports, to track the progress of enumerators, or in emergency contexts.

For example, **Ushahidi**\* records events with the location and time and presents results live on a map.

\*See <https://www.usahidi.com/> Retrieved 10 April 2024

## Inform decision-making

This characteristic relates to a tool's ability to promote evidence-based decisions. Data needs to be presented in a way that accurately represents the context and so that it can easily be interpreted by different stakeholders.

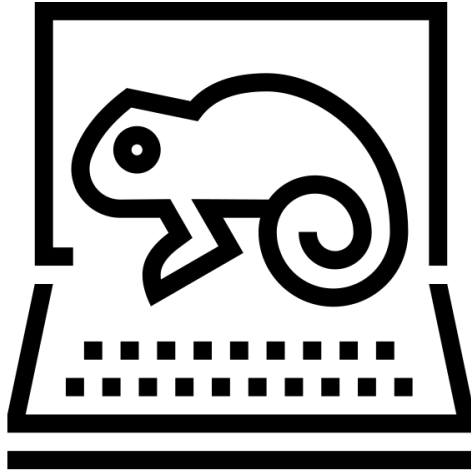


- Tools integrate collection with visualisation.
- Tools allow rapid decision-making without further data analysis

For example, **GoSpotCheck** makes it possible to collect and analyse real-time information thanks to live reports and charts

# Adaptability

Adaptability relates to a tool's ability to respond to the context and research needs. Tools with adaptability:



- Offer offline data collection
- Incorporate data collection methods that do not require high levels of literacy
- Provide language support
- Can be easily integrated with other tools and systems

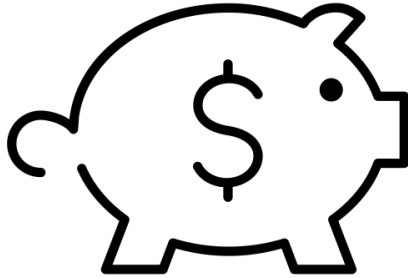
For example, **Exotel\*** collects data using interactive voice response (IVR) in low-literacy rural contexts where there is no access to the internet. Surveys can be created in multiple languages.

See <https://exotel.com/integration-tools/engagebay/> Retrieved 10 April 2024



# Cost-effectiveness

Tools need to be cost-effective and make it possible to conserve resources and efforts to collect or visualise data while meeting research needs and standards. Cost-effective tools:



- Offer an affordable cost per unit / user
- Save an organisation's time

For example, **mWater**\* collects and visualises data online and offline for free.

\*See <https://www.mwater.co/> Retrieved 10 April 2024

# Usability

Usability relates to the user-friendly nature of a tool and how widespread its use is in an organisation. User-friendly tools:



- Do not require special skills or training
- Can be used with participants with disabilities
- Are integrated with other tools an organisation might already be using

For example, **Open Data Kit\*** makes it possible to create powerful forms to collect data (like pictures, text, locations) in resource-constrained contexts.

\*See <https://getodk.org/> Retrieved 10 April 2024

# Data collection and visualisation tools

# List of tools

In this report, we explore:

**Two** foundational literacy and numeracy (FLN) instruments that are increasingly being administered digitally through the tools reviewed, namely:

- [EGRA/EGMA](#) (Early Grades Reading Assessment/ Early Grade Maths Assessment)
- [Uwezo](#)

**Four** mature EdTech tools that have been widely used in the region, plus their case studies:

- [Tangerine](#)
- [KoBoToolbox](#)
- [Turn.io](#)
- [ODK](#)

**One** tool more recently developed and less well known but with potential for expansion:

- [EIDU](#)

Full URLs for links embedded above are given in the subsequent slides.

EGRA/EGMA

# EGRA and EGMA

Early Grade Reading Assessment (EGRA)\* and Early Grade Maths Assessment (EGMA)\*\* are among the most widely used tests to assess basic literacy and numeracy skills.

EGRA and EGMA were developed by RTI international as part of the USAID EdData II initiative in 2006 — first EGRA, followed a few years later, with EGMA.

Both tests are oral and look at the fundamental abilities that underlie the development of reading and maths.

These assessments are open source and readily available for wide dissemination, ensuring that both technical and non-technical audiences can obtain precise, timely, and accessible information about early literacy and numeracy in their setting and are, as a result, able to use them for making choices and developing policies.

These are some skills tested in each assessment:

EGRA	EGMA
Letter recognition	Number recognition
Phonemic awareness	Comparisons of quantities
Reading simple words	Ordering sets of objects, shape recognition and pattern extension
Listening comprehension	Problem-solving

Although both EGRA and EGMA rely on printed material, it is increasingly common for enumerators to use Tangerine to collect, visualise, and share the data. Find more information about the implementation of EGRA/EGMA using Tangerine [in the section on Tangerine](#).

\*See <https://shared.rti.org/content/early-grade-reading-assessment-egra-toolkit-second-edition> Retrieved 10 April 2024

\*\*See <https://shared.rti.org/content/early-grade-mathematics-assessment-egma-toolkit> Retrieved 10 April 2024

Uwezo

# Uwezo survey

Uwezo ('capability' in Kiswahili) is a household-based programme that was designed to help children in Kenya, Tanzania, and Uganda develop their reading and numeracy skills. In 2009, Kenya launched the Uwezo Annual Learning Assessment surveys.

Uwezo employs a cutting-edge strategy for social transformation, led by citizens. The country teams depend on thousands of volunteers and hundreds of local partners, who are essential to the initiative's success. The nearly 150,000 sampled households must all be visited, and the children must all be evaluated.

The survey is administered orally. There are six distinct test samples. The maths and reading assessments are based on each countries' Grade 2 curriculum. The tests are set up such that the easiest (lowest) level is tested first. The literacy examinations are administered in the following order: letter (lowest proficiency), word, paragraph, tale, and comprehension (highest competency). The progression in numeracy involves counting (lowest level), number identification, and addition, subtraction, multiplication, and division operations (highest level). The greatest degree of numeracy in Tanzania, however, is multiplication, not division.

Uwezo's main purposes are:

- To obtain reliable, comprehensive estimates of the actual competencies of children in the three countries.
- To measure change in the competencies of children generalised at district, national, and regional levels.
- To raise awareness among citizens on learning outcomes at national and sub-national levels.
- To promote evidence-based policy.

Kenya and Tanzania use English and Kiswahili assessments. Uganda offers English and seven additional local languages: Ateso, Lebacholi, Leblango, Luganda, Lusoga, Runyankore-Rukiga, and Runyoro-Rutooro.

Uwezo has used KoBoToolbox to support their data collection process (<sup>↑</sup>[Uwezo, 2020](#)). This is further explored in the review of [KoBoToolBox](#).



# Other relevant FLN assessments

# FLN assessments in SA and SSA

Even though EGRA / EGMA and Uwezo are among the most widely used instruments in the region to assess FLN, two other assessments have shown promising results in the focus regions.

## ASER\*

The **ASER reading** assessment tool has four levels: letters, words, a short paragraph, and a longer story. It is available in Assamese, Bengali, English, Garo, Gujarati, Gurmukhi, Hindi, Kannada, Malayalam, Marathi, Meitei, Mizo, Nepali, Odiya, Tamil, and Telugu.

The **ASER Maths** tool has four levels: Number recognition (1–9), number recognition (11–99), two digit subtraction with borrowing, and three digits by one digit division. It is available in Assamese, Bengali, English, Gujarati, Gurmukhi, Hindi, Kannada, Malayalam, Marathi, Meitei, Odiya, Tamil, Telugu.

## ICAN\*\*

ICAN stands for International Common Assessment of Numeracy. It is a cross-national, comparative evaluation instrument designed for low- and middle-income countries (LMICs) and was developed and implemented by the People's Actions for Learning (PAL) Network. It serves as an evaluation of fundamental numeracy using widely used items and provides information on early grades. Even for older students, it emphasises deficits in fundamental numeracy. ICAN assesses all agreed-upon competencies that need to be represented in curricula, syllabi, textbooks, and practices outside the classroom (<sup>†</sup>PAL network, no date).

\*See <https://asercentre.org/> Retrieved 19 November 2023

\*\* See <https://palnetwork.org/ican/> Retrieved 10 April 2024

# Case studies

## Case studies

In this section we explore four tools and their on-the-ground implementation in sub-Saharan Africa and South Asia in depth to showcase their reliability, adaptability, usability, cost-effectiveness, and timeliness to inform decision-making.



tangerine®

turn

 KoboToolbox

The KoboToolbox logo features a blue square icon with a white checkmark inside, followed by the text "KoboToolbox" in a blue, sans-serif font.

*Logos are included to help readers easily identify products, but do not indicate any kind of endorsement of the tools mentioned in this report by either by EdTech Hub or the organisations or partnerships referred to in the report.*

Tangerine

# Tangerine

Category	Response
<b>Sector</b>	Education assessment
<b>Educational purpose</b>	Offline data collection, visualisation, and analysis of standardised tests, classroom observations, and surveys.
<b>Description</b>	<b>Tangerine*</b> is open-source software that can be used for electronic data collection. It is designed for use on Android mobile devices. Practitioners can use Tangerine to gather student responses in oral early grade reading and mathematics skills assessments, specifically EGRA and EGMA, as well as to gather interview responses from students, teachers, and principals on home and school context information.
<b>Country implementations</b>	65+ countries
<b>Developer organisation</b>	RTI International
<b>Functionality and features</b>	Design of data collection tools, offline collection, reports, charts, and tables.



tangerine®

\*See <https://www.rti.org/impact/tangerine-mobile-reading-mathematics-assessments>

## Technical details

Category	Response
Licensing	Open source
Offline functionality	Yes
Type of data collected and process	Data collection on mobile computers, including tablets, netbooks, smartphones. Records student responses on assessments. School-based monitoring surveys and reporting instruments.
Type of data visualised and process	Simple graphs and tables; offline feedback reports
Language support	Yes. 100+ languages
Tech support	Yes
Price	Free (self-hosting)

# Overview

**Description** Since Tangerine came on the scene in 2012, it has grown into a full-featured platform with applications in student assessment, classroom observation, professional coaching and feedback, survey research, project operations (including consultant timekeeping and asset management), and clinical research (including case management modules, two-way and peer-to-peer data sync, and data inquiry functions, among others). Tangerine is available in three versions, and can be customised.

By simplifying the planning and implementation of field work, minimising student assessment durations, reducing measurement and data entry mistakes, and removing manual data input from paper forms, Tangerine increases the quality and efficiency of data collection and analysis.

## Technical specifications

Tangerine can be installed on any device running Android version 2.3 or higher; recommended specifications include a minimum 6-inch screen display, 1-GHz processor, 1 GB of RAM and a battery life of at least six hours.

## Educational uses

Tangerine offers:

- rapid content bundling and delivery
- a range of subtest modules, including those most commonly found in EGRA and EGMA
- a wide variety of school-based monitoring surveys and observational instruments
- tailored feedback and suggestions for coaches on how to discuss it with teachers
- built-in timer to automatically record start and end times for reading and maths tests
- geolocation information to track data and go back if needed to correct data
- a content management system

**Funding** Tangerine was developed in 2011 by RTI International with its own internal research funds, and made available to the public through a GNU General Public Licence. RTI redesigned Tangerine and developed a new codebase using the latest technologies in 2018 with funding support from Google.org.



# Overview

## Versions of Tangerine

The basic platform makes it easy for schools or entire systems to record and analyse data, so they can evaluate programmes and make informed decisions. For instance, it has been used to assess literacy outcomes.

Tangerine:teach, on the other hand, tracks individual student progress over time, with quick checks that help teachers pinpoint what each student needs to move forward.

Tangerine:coach (formerly called Tangerine:Tutor) combines and analyses student results and teacher observations to give teachers clear and practical feedback for growth. The reports created offline combine data from classroom observations, assessments, and inventories.

See more details of the different versions at: <https://www.tangerinecentral.org/>



# Design

From its inception, Tangerine was designed as an offline-first product. Understanding the limitations of data collection in LMICs with poor connectivity, downloading a minimal Tangerine installation will consume only 4.7 megabytes of data. Later, adding multimedia content will increase the file size. However, one major Tangerine feature is that it supports updates over the air and incrementally. What does this mean?

*“First, users don’t need to return to HQ or an office to get an update – the new instrument or content can be pushed to them, wherever they happen to be, as long as they can temporarily connect to the internet.*

*Second, only the changes between the existing installation and the update are pushed. Meaning that there are fewer MB to download.*

*This is extremely powerful. It means I can create multiple versions of the same instrument, with varying amounts of multimedia content embedded. I could create a text-only version for my users in rural areas with poor connectivity, a slightly richer experience for those in places where 3G or 4G coverage exists, and an extremely engaging experience for those who have access to Wi-Fi. And my users can elect to upgrade at their convenience, based on their needs and preferences.” (†Slade, 2020)*

## How it works

Tangerine facilitates data collection and analysis and makes it accessible for teachers, school administrators, leaders, and policymakers.

Design and use of the data collection tools is divided between three key groups of users:

- **Tangerine project team:** Designs the instruments.
- **Tangerine user:** Uses the online instrument builder to build, test, and review assessments. They then export their files for use on Android, and install and test the instruments on their tablet.
- **Data collector:** Uses the offline assessments in the field to collect data from target contexts and syncs results using internet or mobile data to the Tangerine online database.
- **Tangerine user:** Accesses online data and conducts analysis.

## Tusome — Kenya

In the **Tusome**\* initiative, Tangerine allows stakeholders to gain actionable insights about what is working for teachers and students. Tangerine:Coach is also used to support classroom observation and provide feedback to teachers. Teachers value the feedback collected and analysed through Tangerine and use it to inform their practice.

Tusome aims to achieve improvements in learning outcomes for nearly seven million children in Grades 1–3 in all of Kenya's public schools, 96 special needs education schools, and 1,500 Alternative Provision of Basic Education Institutions in urban slums.

Tusome's efforts have resulted in impressive gains in reading in both Kiswahili and English in Grades 1 and 2. In the external midline evaluation, the percentage of nonreader students in English Class 2 dropped from 38% to 12% between 2015 and 2016. Simultaneously, the percentage of students reading fluently increased from 12% to 27%.

See more at

<https://www.rti.org/impact/tusome-improving-early-grade-learning-kenya>

See also

<https://www.rti.org/impact/tusome-improving-early-grade-learning-kenya>

Retrieved 29 November 2023



## Tusome — Kenya

### How is the tool used?

The classroom observation tool for Tangerine:Coach includes embedded lesson plans made specifically for the Tusome national literacy programme. But the most useful feature of Tangerine for Tusome's adoption is the possibility for coaches to assess the effectiveness of a lesson.

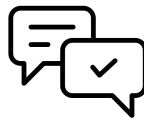
Coaches choose 3 random students and assess learning outcomes with Tangerine



Tangerine automatically analyses the results and suggests a focus area to improve



Coaches use this data to provide accurate feedback to teachers



Feedback is stored for future coaching sessions



### How effective has it been?

To assess Tangerine:Coach's effectiveness, a questionnaire was included in a national census of the coaches and County Directors. Seventy-six per cent of the national population of coaches and 72% of Kenya's County Directors answered the questionnaire.

The results show that 88% of participants used Tangerine:Coach frequently or very frequently. Ninety-eight per cent reported using it on every classroom observation. And perhaps more importantly than the use, 93% of them responded that they believe that their county leadership understands the Tusome data dashboard. This, in consequence, facilitates informed decision-making and transparency.

In addition to other resources used by Tusome, Tangerine:Coach facilitated feedback from coaches to teachers. Using clear evidence, presented in a friendly and easily accessible way, led participants to report increased accountability of coaches and quality of their instructional support to teachers.

More information available from [Piper et al., 2017](#)

## Tusome — Kenya

### What facilitated Tangerine's adoption?

With Tangerine:Coach, in particular, the possibility of ensuring assertive, informed, and useful feedback for teachers was associated with higher-quality instruction and also increased accountability and reliability, providing specific time, location, and evidence to support the feedback. This feature was fundamental to the success of this implementation. Even though the first version of Tangerine is the most widely used, Tangerine:Coach offers detailed feedback with clear evidence to improve practice and inform decisions.

According to [Myers et al. \(2021\)](#), Tusome was able to leverage the use of devices to improve feedback and coaching by:

- Encouraging constructive criticism and shared responsibility, while promoting openness and accountability.
- Utilising the devices as a tool to help a very particular component of teacher coaching, rather than being seen as a panacea.

## School-to-School International — Guinea

Tangerine was indispensable for the [School-to-School](#)\* baseline study in Guinea. The extensive research measures the impact of the Whole Child Model. STS developed EGRA and EGMA tools in Tangerine as well as 10 survey instruments for everyone invested in making schools thrive — teachers, students, and parents. STS tested 480 students in 20 schools and interviewed more than 780 people. It was the first time Tangerine had been used in Guinea.

STS chose to use Tangerine to save time and resources while collecting, visualising, and analysing data. The Whole Child Model features a holistic set of education, health, and engagement activities. If all three of these components are addressed concurrently, STS believes children will flourish in the classroom.

By using Tangerine, STS jump-started its data analysis and reporting.

As part of the technical support that STS offers to multiple partner organisations, all assessment instruments are programmed and uploaded to Tangerine, enumerators receive training on EGRA protocols and procedures, quality control is overseen during data collection, EGRA datasets are cleaned, and EGRA datasets undergo rudimentary analyses.

STS has also worked in Ethiopia, Liberia, Morocco, Uganda, and Zambia using Tangerine to collect and analyse results of EGRA and EGMA, among other assessments.

See <https://sts-international.org/> Retrieved 29 November 2023

STS is an international development organisation dedicated to improving the lives of girls, boys, and their communities worldwide through access to quality education. They focus on creating conditions of success for children around the world. Last year, they partnered with individuals, government ministries, non-governmental organisations, private foundations, and research institutions in 26 countries to assist with research, evaluation, curriculum, training, and strategic planning.

## School-to-School International — Guinea

**What facilitated Tangerine's adoption?** STS used Tangerine to measure student learning on standardised tests. Tangerine offers simple and clear instructions to enumerators to collect data in the field about literacy and numeracy, even without an internet connection. STS works in remote schools and communities. Tangerine's offline feature is therefore indispensable. Tangerine's usability — with easy instructions and display — is another feature to highlight in its adoption in Guinea and other countries where STS works, the user-friendliness of the tool allows for quick enumerator training, and opens up the possibility of involving teachers in the assessment.

### STS use of Tangerine

1

Selection of EGRA and EGMA instruments in addition to 10+ surveys for parents, teachers, and students and uploaded to Tangerine.

2

Enumerators are trained and go out into the communities. They rely on teachers to schedule interviews with parents and students, using Tangerine to store their responses.

3

Once the enumerators have access to the internet, the results are synchronised to the online Tangerine database and accessible to the rest of the team.

4

Results are reviewed online, The STS team is responsible for quality assurance. Location and time can be used to identify issues in data collection and correct them if needed.

5

Analysis is done by exporting the CSV (comma separated value) files from Tangerine.

## Leh Wi Lan — Sierra Leone

**Leh Wi Lan\*** (LWL), Krio for 'Let us Learn', is a five-year programme funded by UKAid and led by the consultancy Cambridge Education (Mott Macdonald), aimed at supporting the Ministry of Basic and Senior Secondary Education (MBSSE) in Sierra Leone. LWL conducted lesson observations and gathered data on several classroom indicators. Data collected through Tangerine is reported on an MBSSE dashboard.

Currently, LWL works on five areas:

1. making schools safe
2. improving learning conditions
3. strengthening central service capacity for service delivery,
4. strengthening district capacity to oversee educational reform
5. improving monitoring and learning.

### **How does LWL use Tangerine?**

LWL employed school support staff to utilise tablets to gather nationwide, real-time school-level data. In 250 secondary schools, the programme's pilot project most recently tested the usage of tablets for data collection. Data from class observations, performance evaluations, and teacher and student attendance records were supplied by the administrators of these schools. LWL will extend portions of this pilot programme to all public and publicly aided secondary schools in Sierra Leone in 2021.

Tangerine was chosen to improve lesson observations, the accuracy, timeliness, and quality of data from schools and classrooms, cut down on paperwork, enable real-time reporting, and provide a tool for performance monitoring. This tool's dual objectives are to help schools enhance the quality of their teaching and learning, while also helping national and local institutions get better access to school-level data for reasoned decision-making.

\*<https://mbsse.gov.sl/leh-wi-lan/> Retrieved 29 November 2023



## Leh Wi Lan — Sierra Leone

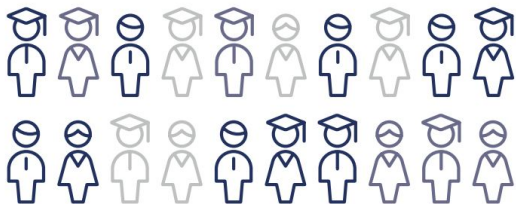
A few of the uses of Tangerine in the LWL project are mentioned in the MBSSE report ([†Ministry of Basic and Senior Secondary Education, 2021](#)).



Tangerine classroom activity data now used as evidence to create teacher CPD content after **200 SSOs and all principals and HoDs**

**in assisted JSS and SSS trained to use classroom data**

Pilot of Tangerine devices with **20 principals and SSOs** showed how SGLA items embedded in Tangerine can help principals, mentors and teachers



More time for coaching and greater performance management and accountability after development of **real-time**

**data dashboards** reduced administration and processing time

More consistent and higher quality feedback after **100,000+ classroom observations** reported through Tangerine



# Leh Wi Lan —Sierra Leone

## Impact

The programme's main goal is to raise secondary school students' academic performance, particularly of female and SEND students. By making the learning environment safer and more effective, the programme hopes to enhance the learning circumstances for 1.4 million pupils, improving secondary exam pass rates. It is anticipated that this focus will persist in the future Free Quality Education Programme.

At the national level, the data obtained through LWL using Tangerine is:

- enabling the MBSSE to monitor district performance in a decentralised service delivery model
- identifying pockets of good performance ('positive deviance') in districts and understanding the reasons for this
- realising system (in)efficiency through low classroom instructional hours
- eventually setting up a national assessment unit to sustain data-led decision-making after project completion.

At the district level, individual district data is being used to support localised action plans and performance monitoring. The data is also being used at classroom level to develop a granular understanding of what foundational skills are lacking in pupils, and develop pupil remediation tools ([↑De et al., 2021](#)).

## What facilitated Tangerine's adoption?

For the success of the LWL project, Tangerine's reliability and timeliness allowed for higher accountability and easier decision-making. The usability of the tool in addition to the offline feature has made it possible to assess the performance of both students and educators, which has in turn informed instruction strategies and highlighted successful classroom practices.

## Tangerine's characteristics as a high-quality tool

- **Adaptability:** The offline collection feature ensures that data from remote schools is also included in the analysis. Additionally, the information uploaded can be specific to the national curriculum, the focus subjects, and even the connectivity level or storage limitations. Tangerine also enables adaptations to more than 100 languages.
- **Usability:** User-friendliness allows for an easy adoption of the tool at all levels: teachers, coaches, and decision-makers. For instance, Tangerine:Teach offers easy-to-read student and class-level result reports. Tangerine's ability to embed multimedia has allowed RTI to use GIFs as part of their training with people who have not had previous experience with tablets, smartphones, or digital apps. Another added value of Tangerine is that the enumerators do not have to use a separate stopwatch or mobile phone to keep time while administering assessments.
- **Reliability:** Tangerine has been widely used in sub-Saharan Africa, and the instrument's design yields consistent results. To minimise missing data and data mistakes, Tangerine employs automated skip patterns, range checks, and field validations. Tangerine enables daily data synchronisation and upload — direct from the data collectors — for quick statisticians' quality-assurance analysis. This capability enables problems with data collection can be easily discovered and fixed even when working in the field.
- **Timeliness:** Feedback can be shared with school leaders and teachers immediately. As soon as an internet connection is available, the user can upload the results as CSV files for analysis. Tangerine-derived data often requires less cleaning and does not require manual entering of paper-based data after data collection, which reduces the amount of time needed between the conclusion of data collection and processing.
- **Informs decision-making:** Live data can inform actions at classroom, school, or ministry level. For instance, Tangerine:Teach provides data-utilisation guidance to improve instruction based on students' outcomes. Additionally, using Tangerine:Coach, coaches can provide specific feedback to teachers based on classroom observations to inform their instruction.
- **Cost-effectiveness:** The app is free, although it might require purchasing devices, access to the internet, electricity to charge devices, and storage space. Even with all these costs, [↑Principles for Digital Development \(2014\)](#) conducted a randomised control trial with coaches in Kenya to assess Tangerine's cost-effectiveness. The results pointed to Tangerine as the best option, given that a device (tablet, in this case) could serve up to 15 schools. Since then, the deployment has expanded to include instructional coaches who serve over 24,000 schools throughout Kenya and has been expanded to Sierra Leone, Cambodia, the Kyrgyz Republic, Liberia, Bangladesh, Georgia, and Uganda ([↑RTI International, 2022](#); [↑Strigel, 2022](#)).

## Challenges with the use of Tangerine

- Even though the tool can be used offline, users need internet connectivity to share the data and report. This is still a challenge in SSA and SA. Researchers or implementors should consider ensuring mobile data or airtime bundles to make the most of Tangerine's features.
- Although Tangerine tends to offer higher degrees of reliability than paper-based assessments, data collection is not foolproof, there is always a potential risk of input errors or loss of data.
- Tangerine has made data collection easy and accessible; however, that has meant sacrificing more advanced features, such as relational forms, which may be required for more complex exercises. On the other hand, in LMICs with low access to devices and low familiarity with technology, using Tangerine might require additional training.
- Tangerine is free, but devices are still required to administer assessments, classroom observations, record or visualise the data. These costs should be considered when opting for Tangerine. Additionally, loss, theft, and damage to devices create the potential for financial loss or personal harm.

(↑[USAID, 2016](#)).

**KoBoToolbox**

# KoBoToolbox

Category	Response
<b>Sector</b>	Humanitarian
<b>Educational purpose</b>	Monitoring and evaluation of students' performance, attendance, perceptions, needs, living conditions, support, and more.
<b>Description</b>	KoBoToolbox is free and open-source software, comprising a suite of tools that can be used for data collection in the field. It is particularly designed for use in environments which may be challenging. KoBoToolbox is mostly used for data collection in settings of humanitarian crises and within research and aid projects in low- and middle-income countries.
<b>Country implementations</b>	Sierra Leone, India, USA, United Kingdom, Pakistan, Syria,
<b>Developer organisation</b>	Harvard Humanitarian Initiative
<b>Functionality and features</b>	Create forms, collect, analyse, and manage data online or offline in challenging conditions.



## Technical details

Category	Response
<b>Licensing</b>	Open source
<b>Offline functionality</b>	Yes
<b>Type of data collected and process</b>	Data can be collected offline through logic-driven forms with multiple types of questions built on the app.
<b>Type of data visualised and process</b>	Data is presented immediately on dashboards and can be exported for further analysis.
<b>Language support</b>	Yes. Form content: any language; User interface: English, French, Spanish, Arabic, Hindi, Kurdish, Chinese.
<b>Tech support</b>	Yes

# Overview

**KoBoToolbox\*** enables researchers, educators, and decision-makers to gather data on the go with mobile devices like tablets or smartphones in addition to paper and PCs. It is constantly being enhanced and optimised, especially for use by humanitarian actors in crisis situations and challenging field settings, in order to assist needs assessments, monitoring, and other data-gathering operations.

The key to saving the lives of those who are most at risk in a humanitarian catastrophe is swiftly gathering accurate information. Because there are limited efficient ways to quickly collect and analyse this vital information, understanding the demands of the community is frequently disregarded. To meet this pressing demand, KoBoToolbox was developed as a free and open-source toolbox for data gathering and processing in difficult situations like humanitarian crises. The only sources of funding for KoBoToolbox are grants and contributions from their partners.

## **Educational uses**

Allows for qualitative and quantitative data collection, offline or online, paper-based or electronically. Educational data collected on KoboToolbox has included students' learning outcomes, engagement, attendance, and opinions and perceptions. KoBoToolbox has also been widely used with teachers to measure their knowledge and self-efficacy, among other aspects of their instruction.

## **Funding**

KoBoToolbox is funded entirely through grants and donations. KoBoToolbox was founded in 2005 by Phuong Pham and Patrick Vinck. In 2013, with funding from USAID, the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) and the International Rescue Committee (IRC) partnered with KoBoToolbox to take the existing tool and transform it into a comprehensive platform for humanitarian data collection. Since 2013, funding for KoBoToolbox has been received from a combination of UN organisations, international humanitarian NGOs, and private foundations.

\*See <https://www.kobotoolbox.org/> Retrieved 12 April 2024



# Design

## Functionalities and features

- Form builder: Allows use of templates of questions, builds complex forms with skip logic and validation, includes more than 20 types of questions (including location and videos).
- Collects data online or offline, on phones, tablets or any browser; offers strong safeguards against data loss. Data is immediately available after collection.
- Analyses and manages data: Creates summaries, visualisations in maps, disaggregates and exports.

KoBoToolbox offers offline or online data collection supported across devices. Through a form builder or reusing question blocks and advanced logic, researchers, decision-makers, and education stakeholders can collaboratively collect data.

Additionally, forms can be imported or exported using XLSForms. KoBoToolbox ensures safe data collection through a Secure Sockets Layer (SSL). SSL keeps an internet connection secure, protecting any sensitive data that is being sent between two systems.

After the data is collected, it can be synchronised and shared.

KoBoToolbox offers functional data visualisation features and the possibility of exporting the data, for instance, for use in statistical packages such as SPSS

(↑[Carver, 2021](#)).

## Dialling up Learning — Ghana

Following the reopening of schools in Ghana, the study with the short title 'Dialling up Learning' (†Afoakwa et al., 2021) investigated the effects on students and instructors of delivering educational content via interactive voice response (IVR). The study used KoBoToolbox for data collection. The learning content came from the Rising On Air (ROA) audio collection, a 20-week project created by [Rising Academies](#)\* to enhance student learning through radio broadcasts during the Covid-19 pandemic. A randomised controlled experiment comprised Omega schools, a group of Rising Academies' 30 low-cost private elementary schools, across the Central, Eastern, and Greater Accra regions of Ghana, encompassing a mix of rural and urban settings. Randomisation was used to assign half of the schools to the student intervention and the other half to the teacher intervention.

Seven hundred and nineteen students in Grades 4, 5, and 6 of the total sample of 1,359 pupils received daily audio lessons that concentrated on fundamental numeracy abilities. One hundred and sixty instructors out of the sample's total of 333 teachers attended weekly professional development sessions centred on the teaching of basic reading. The tool chosen for data collection and assessment was KoBoToolbox. Both students and teachers answered paper-based assessments, and the results were later input into KoBoToolbox.

Although most students said they liked the intervention and wanted it to continue, there was no discernible impact on children's' maths abilities throughout the student intervention. However, the teacher intervention's outcomes showed that teachers' knowledge of phonemic awareness, phonics, and morphology had improved. Although the potential influence on student results was not assessed, teachers' confidence in their capacity to enhance students' reading and engagement skills grew.

The cost-effectiveness, usability, adaptability, and reliability of KoBoToolbox allowed for accurate data that later informed researchers, schools, and donors about the effectiveness of the interventions, areas to improve, and strengths. Timely and reliable data allows planning for more practical low-tech fixes in future interventions.

\*See <https://www.risingacademies.com/> Retrieved 14 April 2024

# Dialling up Learning — Ghana

## How did 'Dialling up Learning' use KoBo?

Student assessments were printed and distributed to each of the 30 schools in the study. Assessments were administered in groups by grade level, with supervision from school staff and the leader of the school. At the baseline, teachers entered the raw student answers into a KoBoToolbox data collection app.

Similarly, teachers were asked to respond to the Teacher Knowledge Assessment and Tschannen-Moran's Teacher Sense of Efficacy Scale. Teachers themselves entered their responses directly into KoBoToolbox.

KoBoToolbox offers reports, tables, and maps to visualise the data collected, as well as the option to download and analyse it further using different software.

## KoBoToolbox features that allow for easy adoption

- Form builder: The possibility of creating customised surveys or other data collection instruments that respond to research needs, cultural context, or language makes KoBoToolbox easy to adapt. Dialling up Learning used this feature to add questionnaires to assess self-efficacy, for example.
- Instruments in library: KoBoToolbox already has premade questionnaires and instruments, which saves time and resources. For instance, assessments of literacy and numeracy are available.
- Simple, immediate visualisation and analysis: Regardless of the format of the data collection (paper-based or digitally, directly on KoBoToolbox), this tool offers user-friendly visualisations of the data to inform decision-making and speed up the analysis process. As soon as the enumerator has access to the internet, the data is uploaded and synchronised and immediately presented in dashboard reports, frequency tables, or maps. These were used for the final report of the intervention and made it possible to see that the education intervention was not as effective as expected.

## Can't Wait to Learn — Lebanon

Lebanon presently accommodates the most refugees per capita ([↑UNHCR, 2024](#)). EdTech is increasingly being investigated as a way to enhance learning and educational requirements. Can't Wait to Learn (CWTL) is a curriculum-aligned learning programme provided through tablets. It uses a gaming strategy to tackle some of the numerous obstacles to access to high-quality education in areas impacted by conflict. A quasi-experimental study found that children who got CWTL instruction five days a week for six months learnt much more about maths than children in the comparison group who received state-provided non-formal education ([↑War Child Holland & Ahfad University for Women, TNO, 2016](#)). The results validated the use of CWTL in Lebanon, and, although they highlighted low attendance, the children who participated significantly increased their numeracy performance and self-esteem.

### **How did CWTL use KoBoToolbox?**

All assessments were conducted in one-to-one interviews with trained research assistants, who read scripted questions and recorded responses using KoBoToolbox. Among the assessments, War Child Holland included numeracy tests, well-being, self-esteem, and psychological distress. Additionally, they recorded fidelity, attendance, and retention. KoBoToolbox can perform an initial analysis and export the data for more in-depth analysis by other software.

### **Features of KoBoToolbox that facilitated the adoption**

As for the study in Ghana, KoBoToolbox made it possible to use ready-made instruments (e.g. for mathematics assessment) and create new instruments, such as those needed to measure self-esteem and well-being in this case. The dashboards allow for fast analysis and can indicate if there has been an error during data collect.

For more information on CWTL, see [↑Turner et al., \(2022\)](#).

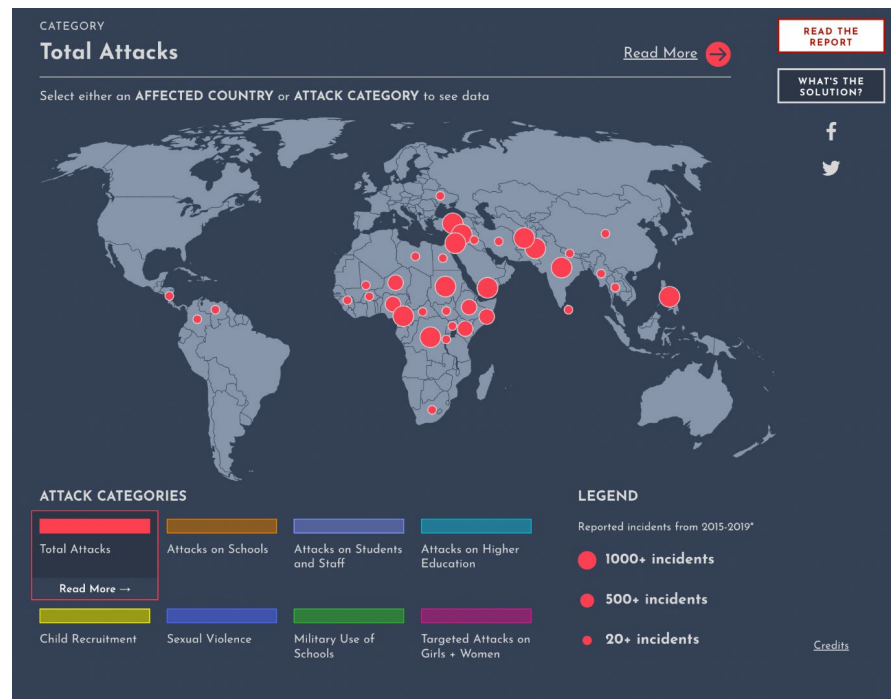
# Other relevant uses of KoBoToolbox

## Strengthening global data on attacks on education

The programme Protect Education in Insecurity and Conflict (PEIC) along with their partners Global Coalition to Protect Education from Attack (GCPEA), UNESCO, and KoBoToolbox have the vision to strengthen the collection, sharing, and visualisation of data on attacks on education and education insecurity. War, conflict, and insecurity are no reasons to deprive individuals and communities of their right to safe, quality education. The vision is to make accurate data available as a global public good to ensure justice, as well as to prevent future attacks and ensure that post-conflict societies can harness the power of education to build peace.



See  
<https://educationaboveall.org/our-work/our-projects/strengthening-global-data-attacks-education>  
 Retrieved 1 December 2023



Source: (<sup>†</sup>Global Coalition to Prevent Education from Attack, 2020)

## Other relevant uses of KoBoToolbox

### **Show me the data: Leveraging digital tools for Nepal's Covid-19 response**

The UN's Development Programme (UNDP) Nepal's Accelerator Lab and Crisis Bureau's SURGE Data Hub jointly conducted a digital Socio-Economic Impact Assessment (SEIA) in the Gandaki Province, known for its ethnic diversity and livelihood opportunities. The study will inform policies for the upcoming annual budget of the region.

The Covid-19 pandemic disproportionately impacted youth, with widespread closure of educational institutions. UNDP Nepal engaged almost 100 students in educational webinars on digital data collection and visualisation in crisis situations using KoboToolbox and Microsoft Power BI. The trainings aimed to mobilise and empower young volunteers and build capacity for future research activities.

*"While conducting surveys after the 2015 Nepal Earthquake, I had to go to remote communities with a bag of surveys, notebooks and pens. With Kobo Toolbox, I can collect data digitally without using all that paper,"* said Narayan Pandey, a participant at the training ([↑UNDP SURGE, 2021](#)).

## KoBoToolbox's characteristics as a high-quality tool

- **Usability:** It requires little technical knowledge to manage, and therefore requires minimal training for enumerators and teachers. It is based on the open-source data collection platform Open Data Kit (ODK), which creates an easy transition for most organisations working in the field. KoBoToolbox is fully compatible and interchangeable with ODK but delivers more functionality, such as an easy-to-use form builder, question libraries, and integrated data management. It also integrates other open-source ODK-based developments such as formhub and Enketo. KoBoToolbox is used by several humanitarian organisations and as a result, enumerators require minimum training to customise KoBoToolbox to their research needs.
- **Adaptability:** Designed to perform well under challenging circumstances such as poor connectivity, basic devices, and limited knowledge of digital collection tools. It is optimised for humanitarian work. If it fails, a paper-based option can be used and later imported into KoBoToolbox to share it, integrate it with other data and run analyses.
- **Reliability:** Information collected through KoBoToolbox is more accurate than paper-based methods. Real-time data validation reduces enumeration errors, and transcription errors are entirely eliminated. Because it is well known within the development sector, organisations are more confident to adopt it as their data collection and visualisation tool.
- **Timeliness:** Compared to paper-based data collection, KoBoToolbox significantly reduces the time needed for transcription.
- **Informs decision-making:** Information can be accessible and analysed within minutes after collection.
- **Cost-effectiveness:** It is free and can be improved by users. All humanitarian actors can create accounts on the dedicated server and use them without limitations on data or time.
- **Security:** KoBoToolbox adopts rigorous process to prevent unauthorised access to data.

## Challenges with using KoBoToolbox

- Lack of ability to view and update records from the mobile app. KoboCollect does not support offline editing of records once submitted. It requires an internet connection, so if data needs to be updated, the whole survey needs to be administered again, which can make it unviable for large-scale data collection projects or longitudinal projects, which require monitoring the progress of schools, students, and teachers over time.
- Similarly, enumerators have complained about not being able to add a question to an existing form because this would mean having to redistribute the instrument and losing the existing data.
- Lack of dropdown menus makes data input of repeated information longer than necessary, as repeated information has to be entered several times. Additionally, since everything must be entered manually, if the enumerator incorrectly types the name of the community, it might create a new 'location'. A dropdown option would improve this ([↑Kale, 2020](#)).
- Usability, especially when creating and managing forms, could be improved. The user interface is not always intuitive, and data can be distorted when downloaded.



Turn.io

# Turn.io

Category	Response
<b>Sector</b>	Telecommunications for social organisations
<b>Educational purpose</b>	Turn.io's <a href="#">Chat for Impact</a> * platform has played an important role in supporting social impact organisations around the globe as they develop better and more robust education systems.
<b>Description</b>	Turn.io was originally born out of a need to reduce the cost of large-scale SMS programmes. They created a low-cost, cloud-based application that seamlessly interacts with the WhatsApp Business API in keeping with their concept to support the work carried out by social-impact organisations. With the help of Turn.io, organisations from all over the world can now conduct one-to-one, facilitated discussions with thousands of people at once.
<b>Country implementations</b>	180 countries
<b>Developer organisation</b>	Praekelt.org
<b>Functionality and features</b>	Turn.io makes it possible to set up a helpdesk, build a chatbot, collect data, or deliver behaviour change communications

\*See <https://chat.whatsapp.com/LDrhO8Mq8BqIEHOVsVWipD> Retrieved 14 April 2024

## Technical details

Category	Response
<b>Licensing</b>	Proprietary
<b>Offline functionalities</b>	No. It relies on WhatsApp
<b>Type of data collected and process</b>	Qualitative and quantitative data is obtained through surveys via WhatsApp
<b>Type of data visualised and process</b>	Conversations are all presented in a dashboard, where they can be grouped in collections for easier analysis. However, for further analysis and visualisation, data needs to be exported.
<b>Language support</b>	Yes
<b>Tech support</b>	Yes. Online support through WhatsApp and offline through manuals and guides
<b>Price</b>	Ranges from USD 499 to 2500 per month depending on the number of users, conversations, and quantity of WhatsApp numbers.

# Overview

**Description:** Turn.io\* is a Public Benefit Corporation (PBO) optimised to build world-class software products for social impact organisations. Turn.io now works with over 150 social impact organisations who have built chat services to improve health, employment, education, climate, agriculture, humanitarian response, financial inclusion and civic engagement.

Turn.io commits to helping social impact organisations build, improve, and scale education services through the use of its behaviour change SaaS platform and learning community while closing the digital divide by connecting to large-scale messaging platforms such as WhatsApp.

During the Covid-19 pandemic, Turn.io's Chat for Impact platform played an important role in supporting social impact organisations around the world to offer alternative education experiences, especially for those in increased vulnerability.

\*See

<https://chat.whatsapp.com/LDrhO8Mq8BqIEHOVsVWipD>

Retrieved 14 April 2024

**Educational uses:** Turn.io assists social impact organisations in developing scalable chat-for-impact programmes to serve teachers and students internationally as a behaviour change SaaS platform and learning community.

**Funding:** As a PBO, Turn.io has been created to generate social and public good and operate in a responsible and sustainable manner. Its funding comes from the execution of their projects with +150 renowned organisations.

# Design

## Functionalities and features

Through WhatsApp, Turn.io enables:

- 1-2-1 chats with users to deliver personalised, real-time, support.
- Quick replies for fast, standardised responses with text, image, video, audio, or stickers
- Personalised menus and creation of automated replies to common questions.
- Viewing, downloading and remixing templates from the Chat for Impact community.
- Collection of registration data or impact evidence from millions of people with simple flows.
- Setting goals and tracking individual user behaviour and collective impact.
- Setting up of a helpdesk, building a chatbot or delivery of behaviour change communications.

For a visual example of the use of turn.io for behavioural change during the Covid-19 pandemic, see <https://www.turn.io/product/features> (retrieved 14 April 2024). More information on how turn.io supported WHO in a holistic response to the pandemic is available at <https://www.turn.io/community/conversations/who-health-alert> Retrieved 14 April 2024

# The FunDza Literacy Trust — South Africa

The aim of the [FunDza Literacy Trust](#)\* is to encourage young people to read and write. The trust has started to interact with students using WhatsApp, the most popular messaging app in South Africa. FunDza can now deliver reading material over WhatsApp, and there are plans to include reading tournaments and challenges to boost user involvement. Additionally, FunDza uses Turn.io to track engagement and learning progress through quizzes and other reading comprehension assessments ([Koomar & Blest, 2020](#)). Among other reasons, Turn.io was selected for the following reasons:

- usage of smartphones and WhatsApp is high in South Africa
- it has been proven to impact behavioural change
- it facilitates engagement with participants.

## How did FunDza use turn.io?



Participants texted “hello” to 0600 54 8676 on WhatsApp



Participants get access to culturally relevant stories, plays, blogs, and poems



Turn.io monitors participation, engagement, and progress



Participants engage with reading comprehension assessments through WhatsApp



Turn.io records the data, so researchers can analyse it and export it to other analysis software

## FunDza — South Africa

Turn.io allows for a more efficient use of WhatsApp, compared to using WhatsApp without it. Although the interactions between FunDza and readers could be done on WhatsApp with a real person from the organisation, Turn.io makes it possible to recreate such interactions cost-effectively, opening up the possibility of providing access to content and assessments 24/7. According to a FunDza staff member:

*“We first realised the potential whilst experimenting with the personal version of WhatsApp to engage with our readers. Our partnership with Turn.io allows us to manage the content and the engagement process more effectively.”*

Additionally, turn.io’s expertise in machine learning and behavioural science can promote changes to habits. For example, Turn.io has been used to support smokers to quit and engage in healthier habits.

### **Turn.io features that facilitated adoption by FundZa**

- Easy data collection without requiring enumerators to travel and be exposed to Covid-19.
- Frequent assessments provide a clear understanding of readers’ progress continuously, with minimal effort.
- Responsiveness: Turn.io simulates interactions with the reader, answering FAQs and providing material and assessments.

# UNESCO — India, Brazil, Kenya, South Africa, United States of America

As part of UNESCO's ongoing commitment to support education outcomes, it is committed to sharing best practices, training, and knowledge on 'chat for impact' services.

The objectives of this initiative were and are:

1. Supporting the equitable continuation of learning during the Covid-19 pandemic
2. Ensuring a full and fair return to education
3. Strengthening learning systems for the future

## Features that facilitated adoption

- Scalability: Initiatives using Turn.io can be made scalable to larger audiences easily and at a low-cost.
- Cost-effectiveness: Compared to SMS-based interventions, WhatsApp is more efficient, requiring fewer resources to be deployed.
- Usability: WhatsApp popularity facilitates participant and user understanding of the project.

## How did UNESCO use Turn.io?

This initiative focused on two action areas: Digital learning content and capacity development.

- Turn.io supported the development of culturally responsive learning content of already available free content.
- Turn.io was used to build or strengthen learning platforms.
- Turn.io was used to create or enable access to teacher training resources.
- Turn.io was used for capacity development to strengthen system resilience and response to future shocks.
- Turn.io supported the training process for teaching staff to use the digital platform and create content for distance learning.

Turn.io commits to helping social impact organisations build, improve, and scale education services through the use of its behaviour change SaaS platform and learning community while closing the digital divide by connecting to large-scale messaging platforms such as WhatsApp.

See <https://globaleducationcoalition.unesco.org/members/details/389>  
Retrieved 4 December 2023



## Nal'ibali — South Africa

During the Covid-19 pandemic and the related national shutdown, Nal'ibali, South Africa's reading for pleasure initiative, launched its WhatsApp narrative in an effort to give families with restricted internet connection more affordable access to free and high-quality children's stories.

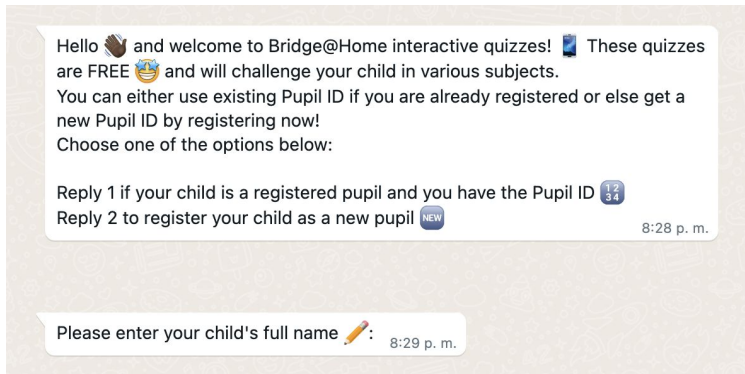
Families may access up to 10 different stories in their favourite languages by simply messaging the word 'stories' to Nal'ibali's Turn.io WhatsApp number, 060 044 2254. The stories are accessible in English, isiZulu, isiXhosa, Afrikaans, Sepedi, Sesotho, Setswana, Siswati, and isiNdebele. The chatbot offers written stories or audiobooks, thereby providing accessibility to those with visual impairments. Data about engagement and preferences can be collected and analysed.

### Turn.io features that facilitated adoption

- **Adaptability:** The content can be easily updated and adapted to local languages or to a particular need, for instance, offering audiobooks.
- **Cost-effectiveness:** Compared to printed materials and distribution, a WhatsApp alternative is significantly more affordable.
- **Usability:** WhatsApp popularity facilitates participant and user understanding of the project. Chatbots are easy to use and to adapt.

## NewGlobe by Bridge — Nigeria, Liberia, Uganda, Kenya, and India

NewGlobe is the parent company of Bridge Academies international, among other organisations. Bridge provides courses based on national curricula, delivers teacher training and support programmes, and makes use of cutting-edge technology.



Screenshot of our interaction with Turn.io's chatbot.

Highly effective mobile chat-based interactive quizzes are distributed through NewGlobe's Bridge Academies International to learners in Nigeria, Liberia, Uganda, Kenya, and India. The interactive quizzes have been developed using Turn.io and are accessible via WhatsApp. The chat feature allows students to select a quiz and then receive prompt feedback as they proceed through the questions. The quizzes are available for multiple subjects and grades. Turn.io works by leveraging the familiarity of users with WhatsApp. Through doing so, it offers education opportunities while retaining the simplicity and familiarity of WhatsApp's chat feature.

## Other relevant uses of Turn.io

**Sesame Workshop** used and continues to use a WhatsApp Chatbot to provide engaging educational content for families across Latin America during the Covid-19 pandemic and beyond, including comic books and storybooks.

**Prestasi Junior Indonesia** is significantly scaling its Cha Ching Curriculum financial literacy programme through a WhatsApp bot that uses the Turn.io platform.

**Craft Education** is a social enterprise that promotes inclusive and equitable quality education and lifelong learning for children with autism and social communication delays via mobile technology. It aims to give 3 million African children with autism or related disorders a better quality of life.

**TeacherConnect** is a WhatsApp service that includes a comprehensive collection of valuable information and resources that allow for deep engagement and feedback opportunities for teachers via WhatsApp in South Africa

**The British Council in South Africa** developed a WhatsApp-based information site to help parents and caretakers throughout the Covid-19-related school shutdown time. Audio lessons, tales, and songs for Reception to Grade 4 are available on the freshly developed site. It is accessible in Lesotho, Namibia, and South Africa.

The resource site uses Turn.io to offer greater assistance to teachers by remotely delivering language and literacy resources that are simple to use at home. 3,500 individuals have already registered to utilise the resources.

**Worldreader** is an international non-profit supporting vulnerable and underserved communities by providing digital reading solutions to improve literacy development, learning outcomes, and gender equality and has developed a Chat service to drive engagement.

## Turn.io's characteristics as a high-quality tool

- **Adaptability:** The content or assessments can be entirely customised to fulfil researchers' or implementers' needs. For instance, offering materials in multiple languages or offering audio versions. However, it requires access to the internet, which might exclude marginalised communities.
- **Usability:** Relying on WhatsApp makes the contents and assessment accessible to wide populations because of its popularity in SSA and SA. Programmes seeking to introduce new technology together with new evaluation or instructional methodologies are more likely to fail than those that use technology that people are already familiar with to some extent ([USAID, 2016](#)). Additionally, Turn.io offers multiple ways of supporting their customers:
  - The option of a chat with the support team on WhatsApp, scheduling 1-2-1 calls, or the option to 'learn at your own pace' with their documents and guides.
  - Free weekly, basic or advanced technical training sessions.
  - Monthly Town Hall meetings where the chat for impact community discusses new issues with the tool and solutions.
- **Engagement:** Turn.io facilitates engagement of the participants. Compared to traditional SMS interventions, WhatsApp generates six times more engagement. Furthermore, after the first contact with Turn.io through WhatsApp, participants are three times more likely to stay engaged thereafter. The chatbots are also good for promoting engagement by sending follow-up questions.
- **Timeliness:** Turn.io is easy to launch quickly. The WHO initiative in collaboration with Turn.io took one week from brief to launch and was able to reach 14.7 million unique users. Similarly, the cases explored on the previous slide are examples of Turn.io's ability to respond to 'in-the-moment' contextual needs during the Covid-19 pandemic and of 'contextual strengths' such as familiarity with WhatsApp, which allowed for a fast response.

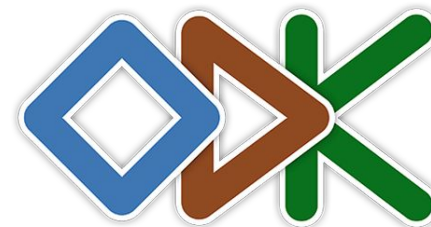
## Challenges

- Users need access to both a smartphone and a data bundle. This is a significant barrier to entry and excludes the most marginalised (†Koomar & Blest, 2020).
- Those with vision problems might not be able to comfortably read on a small screen; therefore accessibility requirements need to be taken into account. Acknowledging these requirements should be considered for all EdTech initiatives (†Koomar & Blest, 2020). The audio options offered by the WhatsApp chatbot could help overcome this challenge, but might not be applicable in all cases.
- Turn.io requires participants to use the internet, which might expose children to risks, especially if caretakers do not have access to training on online-safety in advance.
- Since the performance assessments through Turn.io are fully remote (for instance, the reading comprehension quizzes), there is no assurance that children were actually completing the quizzes without help from someone else, which might raise questions about the veracity of the results.
- Finally, the cost of the service (up to USD 499 per month) has to be considered when choosing this tool. The service for participants is free, but organisations would have to cover the monthly subscription. However, when compared to similar SMS services, Turn.io is more cost-effective and ensures more engagement.

**ODK (Open Data Kit)**

# ODK

Category	Response
<b>Sector</b>	Data collection
<b>Educational purpose</b>	Development of research instruments, education data collection and analysis.
<b>Description</b>	<p>The ODK community produces free and open-source software for collecting, managing, and using data in resource-constrained environments.</p> <p>Through <a href="https://getodk.org/">ODK</a>, practitioners can create offline forms for offline data collection in the field.</p>
<b>Country implementations</b>	Global
<b>Developer organisation</b>	The University of Washington



\*See <https://getodk.org/> Retrieved 15 April 2024

## Technical details

Category	Response
<b>Licensing</b>	Open
<b>Offline functionality</b>	Yes
<b>Type of data collected and process</b>	Allows for multiple types of data input: pictures, text, locations. As well as developing questionnaires and other data collection instruments to be administered offline or online. Instruments can also be administered in a paper-based format and later be input into the system for a more organised analysis and to enable collaboration between different researchers.
<b>Type of data visualised and process</b>	Data can be presented in dashboards or exported. ODK offers a set of tools to facilitate analysis.
<b>Language support</b>	Yes
<b>Tech support</b>	Yes
<b>Price</b>	Free collection; paid-for option if using ODK cloud



# Overview

## Description

ODK's mission is to help create mobile data services including generating data collection forms, collecting data on a mobile device and providing online data storage and aggregation. To achieve this, ODK has created a set of tools. Details of the tools are given below.

## Functionalities and features

- Build powerful forms: Include photos, GPS locations, skip logic, calculations, external datasets, multiple languages, and more.
- Offline data collection: Use either the mobile app or the web app. Forms and submissions are synched when a connection is found.
- Download your data or connect apps like Excel, Power BI, or R to create live-updating dashboards.
- ODK is open-source software. Use as is, customise as you see fit, or try compatible alternatives.

## Funding

"ODK is supported by developers, users, organizations, and others giving what they can, when they can. Members of the community write code, fix bugs, create manuals and documentation, help each other troubleshoot via an online forum, give feedback, suggest changes, fund improvements, and tell others about how great the ODK tools are." (†Joseph, 2019).

## Educational uses

- Build data collection instruments, for instance, to assess learning outcomes, attendance, or engagement.
- Collect data offline, for example, as in the case of the school census in Sierra Leone where access to the internet was very limited. This feature made it possible to map all schools in the country, even in the most remote areas.
- Analyse data live and inform education policy and teaching practices.

# ODK's tools

**ODK Aggregate** provides a ready-to-deploy online repository to store, view and export collected data. Aggregate can run on Google's reliable and free infrastructure, as well as on local servers backed by MySQL and PostgreSQL. Aggregate is an old ODK tool, it is not being updated anymore. Instead, users are invited to use the new tool called 'Central'.

## Features

- Host blank XForms used by ODK Collect or other OpenRosa clients
- Store and manage XForm submission data
- Visualise collected data using maps and simple graphs
- Export and publish data in a variety of formats
- Aggregate can be hosted on cloud providers such as DigitalOcean, and Amazon Web Services, or your own local or cloud server. There is also a pre-configured virtual machine image that is ready to deploy on any computer.

# ODK's tools

**ODK Central** is the ODK server. It is straightforward to install, easy to use, and extendible with new features and functionality both directly in the software and with the use of REST, OpenRosa, and OData programmatic APIs.

Central substitutes Aggregate is a new tool which solves several of the issues found on Aggregate (see previous slide), but is still not used as much as Aggregate. The advantages of ODK Central include:

- 'Projects' allows you to partition your server into different sandboxes to support multiple independent teams
- Direct upload of XLSForm files makes form management easier
- The OData API makes it easy to synchronise live form data to desktop visualisation and dashboard tools
- Managed encryption makes the process of handling encrypted form data significantly easier and, in many cases, more secure

## Features

- Projects to organise users, permissions, and forms
- Form upload and management
- User accounts with role-based permissions
- Encrypted forms (self-supplied or project-managed keys)
- From permissions-managed known users or anonymous public links
- Support for reviewing, commenting on, and editing submissions after upload
- Connectable to data analysis and dashboard applications like Excel, Power BI, or R over OData
- Integrated checklist-based help system
- Optional encrypted offsite data backups to Google Drive
- Clean and modern REST API for integration and extensibility
- High performance on low-cost hardware or cloud providers
- ODK Briefcase-compatible data output
- ODK Briefcase push/pull support

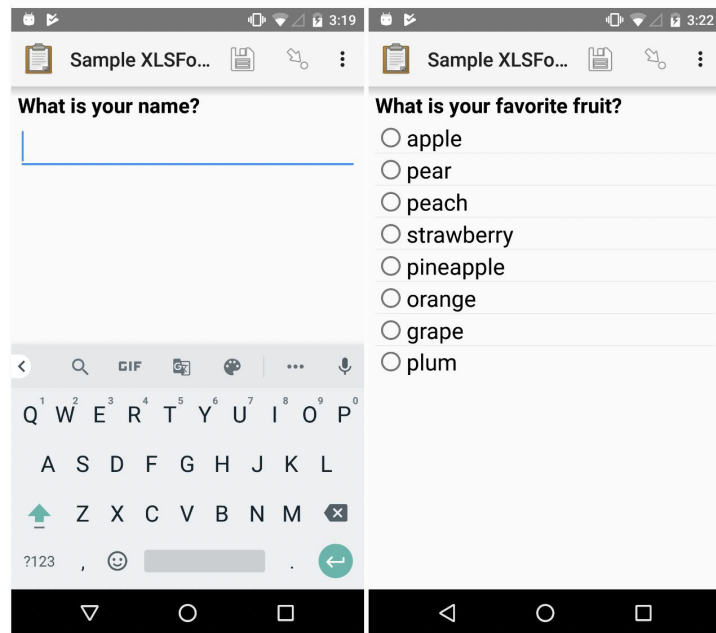
# ODK's tools

**ODK Collect** is an open-source Android app that replaces paper forms used in survey-based data gathering. It supports a wide range of question and answer types, and is designed to work well without network connectivity.

The goal of ODK Collect is to be a versatile tool that can support a wide range of data collection procedures. For many businesses, connecting to a server will be the only configuration required. However, there are other situations when more customisation is beneficial.

## Features

- It renders forms into a sequence of input prompts that apply form logic, entry constraints, and repeating sub-structures.
- Users work through the prompts and can save the submission at any point.
- Finalised submissions can be sent to (and new forms downloaded from) a server.
- ODK Collect supports location, audio, images, video, barcodes, signatures, multiple-choice, free text, and numeric answers. It can even accept answers from other apps on your device.
- Can be downloaded directly from the app store or through github.



Screenshot of ODK Collect.

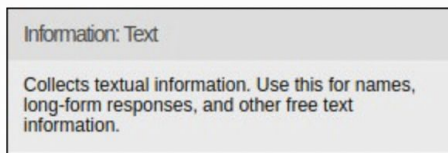
# ODK's tools

**ODK Build\*** is a form designer with a drag-and-drop user interface. Build is an HTML5 web application and works best for designing simple forms.

\*See <http://build.getodk.org> Retrieved 6 December 2023

## Features

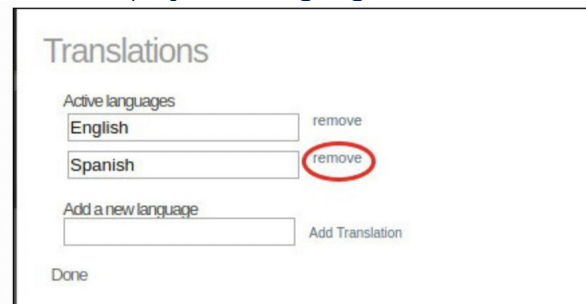
- Allows you to build new forms. Add a new prompt, by dragging the elements from the bottom of the screen onto the blank canvas. The properties of each prompt can be modified and information about each can be displayed to facilitate the building process.



Information: Text

Collects textual information. Use this for names, long-form responses, and other free text information.

- Export forms
- Change the properties of a form
- Add, remove, and display new languages



Translations

Active languages

English	remove
Spanish	remove

Add a new language

<input type="text"/>	Add Translation
----------------------	-----------------

Done

## ODK's tools

**ODK Cloud** is the official hosting service of the creators of ODK and managed by them.

The tool comes with additional support services from the ODK team, supporting users with technical questions related to use of the tool. Data backed up on the cloud is end-to-end encrypted.

ODK Cloud is a paid service.

See <https://getodk.org/> Retrieved 17 April 2024

**ODK Form Uploader** makes it possible to upload a blank form and its media files to ODK Aggregate and ODK Central.

**ODK Validate** ensures that you have an OpenRosa-compliant form that will also work with all the other ODK tools.

**ODK Briefcase** is the best way to transfer data from Collect and Aggregate. This is no longer being updated, these processes are now handled through **ODK Central**.

**ODK XLS2XForm** allows XForms to be designed with Excel.

# Digital School Census — Sierra Leone

## Description

In an effort to digitise the data collection process in Sierra Leone, the World Bank used ODK to collect, analyse, and visualise the data.

There was a lack of current information on teachers, enrolment, and schools' locations. The government calculated that it would take up to a year to update the data using the standard procedure (having schools complete paper-based forms, collecting forms from schools, manually entering the data into a database, cleaning, and analysing it).

The Minister of Education thus requested assistance from the World Bank in helping the government compile precise enrolment and infrastructure data for all the 11,000 schools around the nation, including images, GPS coordinates, information on absenteeism, and the creation of a teacher database in 10 weeks.

## How did the Digital school census use ODK?

The Sierra Leone Annual School Census form was transformed into an ODK format. To reduce data entry errors, a number of field constraints were introduced to the form. The form was created to collect GPS data, photos of each school, and information on student absence, fully utilising the tool's digital nature.

During data collection, statistics were shared daily, which made it possible to quickly identify errors in the process. A customised dashboard was used to disseminate the results after just one week. This can be updated as and when new information is available ([\\*Nमित & Mai, 2019](#)).

# Digital School Census — Sierra Leone

## Impact

- Accurate information and mapping of all schools in the country is now accessible
- Education access can be assessed by analysing data from the census, and on poverty levels and transportation
- The building of new schools will be informed by these factors to ensure a more equitable access to education
- The data also informs textbook distribution and teacher allocation

## ODK characteristics that facilitated adoption

- **Cost-effectiveness:** The total cost for the assignment (including devices, enumerators, transportation, and data analysis) was approximately USD 18 per school.
- **Facilitates decision-making and timeliness:** Data was shared live and can be updated periodically to inform educational policies.
- **Reliability:** ODK has been widely used for similar purposes in other countries of the region facing connectivity issues or collection of large amounts of data in short periods of time and with minimum resources.
- ODK's user-friendliness and wide use among organisations working in development allowed for fast training. The World Bank used a cascade model to train 60 ministry staff in three days.

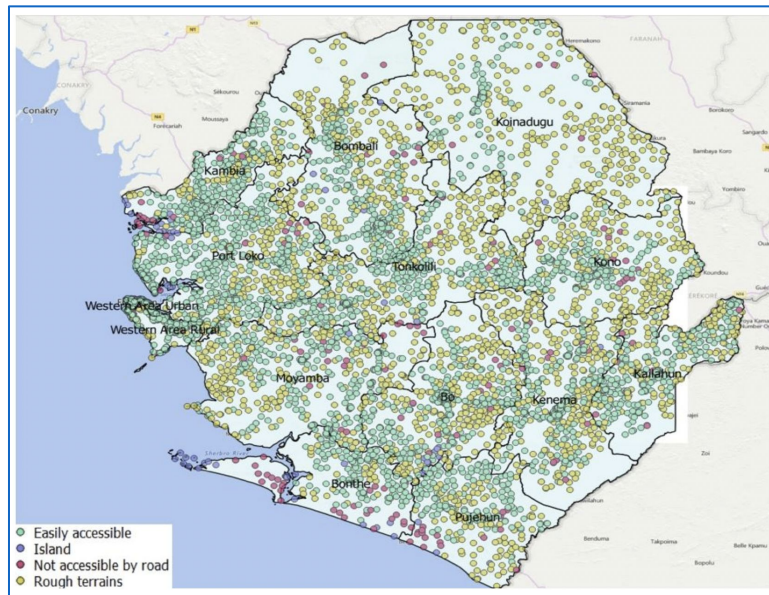


Image showing distribution of primary schools by remoteness in Sierra Leone based on data that was collected in the 2017–18 census ([†Namit & Mai, 2019](#)).



# Early Years Preschool Program (EYPP) — Bangladesh

This study looked at how providing an extra year of pre-primary education in Bangladesh affects children's development outcomes (cognitive and social-emotional), as well as how beneficial the programme was in comparison to its cost. Additionally, the operational and environmental factors that determine how the EYPP was implemented in the community and how it affects its impact and the outcomes of interest (such as children's preparation for school) were examined.

Data International Ltd. (DI) undertook the endline data collection for the impact assessment of Save the Children's Early Years Pre-School Program (EYPP) with funding from the World Bank and oversight from the American Institutes for Research (AIR).

## How did EYPP use ODK?

Preschool children's development was assessed using IDELA (International Development and Early Learning Assessment) methods. The tool for gathering household data was updated, and a new tool for conducting school teacher interviews for the Early Years Pre-School Program (EYPP) was introduced. Specific software was created for the IDELA test and ODK's tools for collecting household data,

## Impact

For the Bangladeshi government, this study will serve as proof of the advantages and costs of giving children an extra year of preschool. This knowledge may be helpful for other nations thinking about similar interventions, in addition to influencing future policy in Bangladesh.

(†Spier, 2019)

## ODK characteristics as a high-quality tool

- **Reliability:** ODK is the standard tool for data collection in public health, global development, crisis response, climate monitoring, and other contexts. ODK is considered more reliable for data collection than paper-based methods. The skip logic feature is said to reduce errors during data collection, and the ability to see data live makes it possible to identify and correct mistakes. According to UNHCR and based on SMART plausibility assessment, all surveys that used mobile data collection with ODK so far have produced “good” or “excellent” data quality.
- **Adaptability:** The offline feature makes it possible to collect data in challenging contexts. The form builder gives researchers the possibility of translating and customising the instruments.
- **Usability:** ODK’s features such as skipping, pre-coded tags, and restrictions can be customised to research needs, making the data collection process easier for enumerators and potentially saving time during data clean up and analysis. ODK makes it easy to convert forms into Excel files, making data entry faster.
- **Timeliness:** ODK Central facilitates synchronisation of data from the collection instruments to a desktop visualisation and dashboard. This allows monitoring of the research or intervention in real time.
- **Cost-effectiveness:** ODK Collect is free, as are the analysis and visualisation features. However, it is worth noting that organisations choosing to self-host on their own server instead of using the ODK Cloud have to pay a subscription.

## Challenges

- Ensuring data protection: Older but still very popular versions of ODK tools had limited options for segmenting access to data. For instance, users in one subnational area could see data from other regions even though it was not needed for their analysis. This could represent a GDPR violation. ODK Central has, however, resolved this issue.
- Guaranteeing the safety of enumerators using digital devices to collect data: A few organisations have highlighted the risk to enumerators of theft and attack because they are carrying devices.

EIDU

# EIDU

EIDU is less well known and more recent than the other tools considered in this presentation; however, it shows potential for future interventions. The EIDU learning platform claims to revolutionise learning by facilitating access to the best globally available learning and teaching resources, constant measurement of learning outcomes, and continuous optimisation for maximal learning impact on whole education systems. Learners access the EIDU learning platform on mobile devices distributed directly to their schools, while teachers receive continuous coaching for their professional development based on the most impactful programmes from around the world.

## How it works

EIDU's vision requires two key elements: a learning platform and an implementation system.

- The learning platform facilitates access to learning and teaching resources, monitoring of learning outcomes, and continuous optimisation for maximal learning impact on whole education systems.
- The implementation system developed addresses the lack of digital infrastructure and the need for scalable, user-friendly, cost-effective initiatives with a profound understanding of the African context.



# EIDU — Overview

**Description:** EIDU is open-source software that allows users to integrate their own content into the EIDU platform. This can include a variety of content types, including learning content for students, teaching materials, and professional development materials. Content is available in local languages for numeracy and literacy from preschool to grade 6.

## Educational uses

- TPD
- Students' literacy and numeracy learning materials
- Standardised, frequent assessments (like EGRA) — approximately 3500/day.
- Parents can monitor their children's progress

**Funding:** Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, Bill & Melinda Gates Foundation, Jacobs Foundation.

## EIDU characteristics as a high-quality tool

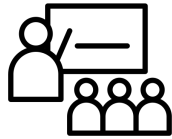
- **Timeliness:** EIDU users can plug AI algorithms into the system, allowed them to measure the effects of learning material in real time, to develop experiments, and to test hypotheses about teaching and learning in a time-effective manner.
- **Adaptability:** Users can tailor the tool to their needs by adding, deleting, and changing tools as and when needed. As such, the tool can constantly evolve with evolving needs on the ground.
- **Reliability:** The assessment tools integrated into EIDU are well-known, trusted resources for measuring student learning. This adds an element of reliability to the tool.
- **Informs decision-making:** Detailed analytics inform school administrators and policymakers about strengths and challenges.
- **Usability:** EIDU has a friendly user-interface, facilitating adoption by varied users with limited technical knowledge. EIDU provides partner schools with a coaching service to facilitate the integration of the app into their lesson planning.
- **Cost-effectiveness:** One Android device per classroom can be used by 20 students, making it a cost-effective solution to improve learning.

# Key takeaways

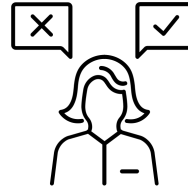


**What have we learnt from these tools about how to effectively implement data collection and visualisation?**

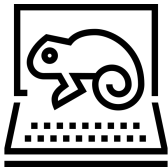
The case studies highlight the following important attributes for effectively implementing data collection tools.



**Capacity-building**



**Informing  
decision-making**



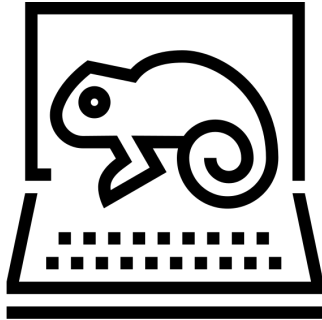
**Adaptability**



**Cost-effectiveness**



**Usability**

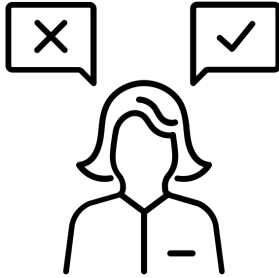


## Adaptability

### **Adaptability facilitates uptake of data collection tools.**

All the tools reviewed had **templates**, allowing the tool to be easily adapted for different purposes, for instance, collecting data on attainment, attendance, performance, and engagement.

Additionally, the tools could administer data collection and visualisation in multiple **languages**, allowing them to be used within a range of contexts and with a range of target users.



## **Informing decision-making**

### **All the tools reviewed had features targeted towards informing decision-making, especially dashboards.**

The dashboards in the tools reviewed update automatically once new data is received, which reduces the time between data collection and visualisation for the purposes of decision-making. This makes the data actionable and saves time, as decision-makers can act on the data before waiting for statisticians to analyse it and produce a full report. In this way, the dashboards save time and money that would otherwise be spent on data analysis and report writing.

The data displayed in dashboards is typically straightforward enough for actors at different levels — including teachers, principals, and ministry personnel — to comprehend and draw conclusions from, without needing a background in statistics. As such, they help to equip more stakeholders at all levels of education delivery with the data needed to make more informed decisions. Similarly, dashboards also facilitate better collaboration between stakeholders

That said, if more complex data analysis is needed, typically, this would not be achieved using these tools. Rather, the data would be exported for complex analysis using other software.

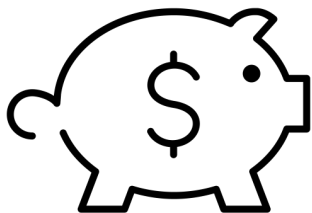


## Usability

**The tools reviewed were effective when they were used *as tools*, to achieve broader educational goals. That is to say, use of any tool must align with specific educational goals.**

Use of a tool should not be a goal in itself. A clear educational goal, such as monitoring teacher attendance, is critical. The tool must then align with this goal, and with existing education practices that support its implementation.

The tools should not add a burden to implementers; rather, they should help them to achieve their education-related goals. Implementations are successful when they include teachers, rather than seeking to substitute them.



## **Time- and cost-efficiency**

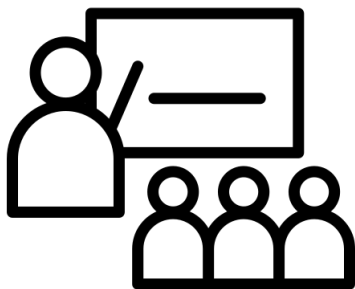
### **Conserving time and resources is a potential benefit of the data collection tools reviewed.**

Digital data collection is faster than paper-based data collection. Additionally, compared to paper-based data collection, the use of digital tools can be more reliable. For example, survey designers can use drop-down lists for data validation to mitigate the risk of errors with data input.

When collecting data digitally, new data can be shared immediately. Others can quickly check the data and flag mistakes. This is faster than paper-based data collection, whereby enumerators would need to input data manually after returning from the field and prior to identifying and potentially correcting mistakes.

With the exception of Turn.io, most of the tools reviewed were free to use. However, even if tools are free, if they are dependent on the use of devices, then the cost of these devices must be considered.

The cost-effectiveness of a tool depends on the scale and duration of its implementation, among other considerations.



## **Capacity-building**

**Capacity-building is critical to the implementation and sustainability of data collection tools and processes.**

This, firstly, includes capacity-building on the use of the tool itself. Programme budgets must account for the costs involved in training enumerators or stakeholders.

Secondly, this includes training key stakeholders on the processes of decision-making which is informed by data. Conducting this capacity-building helps to ensure stakeholders continue to consider and implement data-driven decisions, even when programme funding ends.

**What are the main gaps in the market, and what type of support is needed to address them?**





## Privacy and safety

**There seems to be a gap when it comes to considering the privacy and safety implications of using digital data collection tools.**

For example, Turn.io has initiatives which target children. These require children to use the internet or WhatsApp, perhaps unsupervised by responsible adults. In similar instances, it would be useful for data collection tools to have mechanisms in place that consider the protection and online safety of children using their tools.

In addition to the risks in relation to online safety, it is also important to consider the risks of using the hardware. Enumerators carrying devices such as tablets for data collection may expose themselves to the risk of theft. Data collection programmes should factor this risk into their programme design.

There is a related risk in terms of privacy of data. In instances where data is being shared immediately, there are many people who may have access to the data being collected, including enumerators, analysts, and those hosting the data collection tools. There is a need to consider the permissions that can be leveraged within data collection tools to protect the privacy of the data being collected and shared.



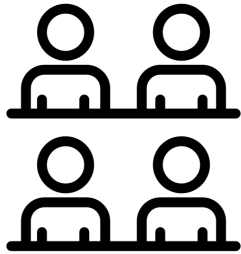
## **Reliability**

**When it comes to fully remote data collection, there is a challenge with ensuring the reliability of results.**

For example, Turn.io collects data fully remotely, without the use of enumerators. In this case, when students are completing assessments, there are no mechanisms in place to check whether they received help in completing the answers, or whether they searched for the answer themselves before responding.

In such instances, it would be useful for the data collection programme to have mechanisms in place to help ensure the reliability of the data collected. Platforms which capture different forms of assessment, like oral assessment and observations, can help improve validity of assessment.

In conclusion, what is the **impact** of **digital** data collection and visualisation tools in the education sector compared to traditional paper-based methods?



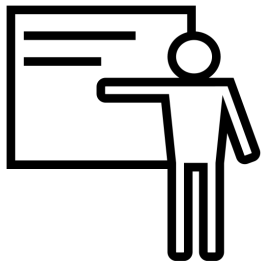
## Students and participants

### Positive impact

- Increased engagement when compared with paper-based or SMS
- Possibility of participating in data collection or FLN implementations without health risks during pandemics, which would be impossible using more traditional methods

### Potential risks

- Tools such as [Turn.io](#) might require participants to use the internet, which might expose children to risks, especially if there are no online-safety trainings for caretakers in advance.
- Accessibility issues have to be addressed to ensure the inclusion of all participants. For example, font size, capacity to read, vision impairments, and technological barriers.
- Data privacy: If not configured correctly, digital tools like ODK could provide access to sensitive data to people that do not require access to it to perform the analysis.



## Educators

### Positive impact

- Accessible and up-to-date data about student performance and teaching practices. Compared to more traditional data collection and visualisation methods, digital tools allow for more frequent and complete data that is accessible more quickly.
- Evidence-based feedback from supervisors can directly impact teaching, for instance, with the use of Tangerine:Coach.
- Improved teaching quality. Since some of these digital tools not only provide data performance-related data but also ways of communicating feedback, coaches can have meaningful conversations with teachers to help them improve in specific areas.
- Lesson plans can be informed by frequent student assessment, helping teachers identify strengths and areas that students need to improve on.

### Potential risks

- Technological barriers might represent an obstacle for teacher professional development.
- Low access to devices and low familiarity with technology in the region might add additional challenges to the data collection process and might require teachers to invest additional time just to understand how to use a device or tool.



## Enumerators and implementers

### Positive impact

- Reduced costs and time needed for data collection, analysis, and sharing
- Increased reliability using automated skip patterns, range checks, and field validations
- Reduced input errors thanks to drop-down menus and autofill functions
- Easy adaptation to multiple local languages, making it possible to reach multiple, low-resource communities, and offer a more representative sample
- Timely data thanks to daily data synchronisation and uploads directly from the data collectors. Additionally, digital data collection allows for speedy quality assurance analysis by statisticians. This capability enables problems with data collection to be discovered easily and fixed even when working in the field.
- If used correctly, the digital tools explored here can assure higher protection of participants' data than paper-based instruments
- Faster launching using digital tools than face-to-face or paper-based approaches, which is vital in response to emergencies

### Potential risks

- Even though the tools can be used offline, to share data and reports, users need access to the internet. In SSA and SA stable internet access is still a challenge.
- Even though most of the tools reviewed are free, they require a high initial investment to purchase devices. If organisations ensure that the devices are cared for and used again in other projects, then the use of these digital tools is more cost-efficient compared to paper-based data collection and analysis.
- Loss, theft, and damage to devices create the potential for financial loss or personal harm.. Interviewees have pointed out that carrying a device for data collection might represent a risk for enumerators in some contexts.



## Decision-makers

### Positive impact

- Faster access to data to inform decisions. Data often requires less cleaning and does not require manual entering like paper-based data after collection, which reduces the amount of time needed between the conclusion of data collection and processing.
- Easy, clear, and dynamic data visualisation throughout the implementation process allows for timely interventions.

### Potential risks

- Fully remote assessments might have lower validity than those done in the presence of an enumerator
- Even though these digital tools tend to reduce errors, no system should be assumed to be foolproof
- In an effort to make information accessible and user-friendly, sometimes a more detailed analysis requires the use of stronger statistics software

# Bibliography



# Bibliography 1 of 4

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