

Raising Learning Outcomes:  
**the opportunities and challenges  
of ICT for learning**

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for every child

## **Appendix 2**

Lessons from in-depth innovator and  
provider case studies



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## Bridge/SPARK - Use of ICT for learning in groups of low cost schools

### OVERVIEW

Bridge is a group of low-cost schools serving more than 100,000 pupils in 520 nursery and primary schools across

Kenya, Uganda, Nigeria, Liberia and India. Its ambition is to transform learning by developing lessons aligned to national curricula using a range of technologies. Bridge uses technology to address whole-school issues including teacher training, lesson delivery, and monitoring and evaluation. Its approach can be systematically applied and embedded across all Bridge schools because of its end-to-end model of school design and development: it controls the entire supply chain from school construction and curriculum design to teacher training and lesson delivery.

SPARK Schools is a network of eleven primary schools dedicated to delivering accessible, high-quality education, mainly in South African cities. SPARK is an acronym for the school's core values: Service, Persistence, Achievement, Responsibility and Kindness. SPARK schools use a 'Learning Lab' rotational blended learning programme, which combines traditional classroom instruction with adaptive software intended to accelerate learning and increase student achievement.

(1) <https://www.nwea.org/map-growth/>

### KEY FEATURES OF BRIDGE AND SPARK



- Bridge's highly standardized 'academy in a box' provides the training, processes, tools, materials and curriculum a community needs to open and run a low-cost quality school.
- Teacher tablets are a core component of the Bridge model. They are uploaded with daily lesson scripts and step-by-step instructions for teachers, regardless of experience.
- Bridge has writers in Nairobi who create lessons in Swahili, but many lessons are delivered in English.
- In the SPARK rotational model, students divide their time between using Chromebooks uploaded with digital content that adapts to the learner, and classroom interaction with a specialized subject teacher.
- In SPARK schools, staff members who facilitate online learning are called 'blended learning facilitators'. They work with specialized subject teachers to adapt their lesson plans. Specialized subject teachers are consulted to ensure a focus on depth rather than breadth

### IMPACT



- In 2015, Bridge published its evaluation, 'The Bridge Effect', which assessed the impact of its approach on kindergarten students. It showed a 43 per cent increase in the number of Bridge students who reached the emergent benchmark in English and a 40 per cent increase in learning subtraction in maths, compared with 22 per cent and 15 per cent increases from their public-school counterparts.
- Bridge teacher salaries are competitive. They can earn up to 90 per cent more than other teachers in similar, low-cost private schools. Staff are paid on time every month and are eligible for maternity/paternity, sick and compassionate leave.
- SPARK has extended its Lab rotational model from serving 160 students in 2013 to 4,000 students in 2017. It targets students from lower middle-income families with average annual incomes of 11,000 rands. The annual tuition fee is 1,900 rands (US\$1,500) which is around a fifth of average family income.
- 91 per cent of SPARK scholars achieved a year-and-a-half of growth in reading during 2013, and more than 50 per cent of SPARK scholars concluded the year 2013 above international grade level standards in maths.
- SPARK takes part in international testing because standardized testing has been abolished in South Africa. NWEA MAP<sup>1</sup> tests the impact of the model and allows for global comparison. However results were not available at the time of writing.

### LEARNING FROM IMPLEMENTATION



#### Every step of implementation in-house.

Retaining total control has been an important feature of how Bridge operates efficiently at the lowest possible cost. As a conglomerate, Bridge has its own estate agents, construction business, furniture makers, curriculum developers, software developers, customer service centre, procurement process and uniform designers. Because Bridge controls its entire supply chain, when any revision or improvement is made to one aspect of the model it can quickly and effectively be rolled out across all of its existing and new academies.

#### Technology unburdens teachers of a range of administrative tasks.

In Bridge schools, tablets allow centralized data collection and analysis. This facilitates many aspects of teaching and learning that would traditionally fall on the teacher to collect and monitor (such as attendance tracking). This data is monitored and analysed, with the central team responsible for continuously improving and strengthening the approach. Bridge teachers undertake ongoing professional development both in the classroom and at off-site training events.

#### Solid connectivity and good infrastructure are essential.

The SPARK Lab rotational model requires a lot of movement between classrooms, so the classrooms need to be close to one another to maximize student learning time and student safety. The SPARK business development team works on infrastructure alongside the academic team (which is dedicated to scheduling and professional development). Chromebooks are used to manage lesson plans and content centrally, and so connection to power is required prior to implementation.

#### Students have control over part of their learning.

SPARK staff create schedules for when student learning takes place based on the proportion of Chromebooks available to students: one device to every four students. However, students engage with content and work through exercises at a rate that suits them. They are also assigned independent work, which they can decide when, how and with whom to complete.

Subject teachers deliver only five lessons a week and are responsible for instilling core values. Within the SPARK rotational model, lessons are taught on repeat to various groups and this requires fewer teachers than a traditional school model. SPARK teachers are also responsible for teaching the school's core values, as well as working with families so that these values are

implemented in the home. Every family completes 30 hours of volunteer work over the course of the school year, including assisting with classroom tasks, taking part in parent committees or attending school events to get a sense of what their children are learning.

### CONDITIONS FOR SUCCESS



#### Technology as a route to efficiency and transparency.

Technology has been a key component in the successful scaling up of both the SPARK and Bridge models. In Bridge schools, day-to-day administration and classroom instruction is accessed via the tablet, making processes more efficient and transparent, especially for new and inexperienced teachers. It is important that technology is effective given Bridge's high student to teacher ratio (45:1), and so a great deal of focus is given to classroom management and leadership. For SPARK schools, technology has played a critical role in enabling a data-led, innovative approach to learning that has been attractive to both parents and investors.

#### Well-trained staff and great leadership.

The expected quality of teachers at SPARK is high, with teachers usually holding degrees in specific subject areas. Teachers receive two hours of weekly professional development, which are focused on how to read and analyse data to manage the classroom effectively. They are also given training on using the Lab rotational model, scheduling, lesson planning and delivery two weeks before the new school year. Principals are responsible for professional development, class observation, one-to-one meetings about lesson planning and teaching, feedback sessions and identifying potential areas for improvement. Bridge teachers are often under-qualified but receive significant support from highly trained Academy managers and a centralized team which provides resources, lesson plans and training on best practices.

#### Changing perceptions and improving understanding of technology.

SPARK has become a thought leader in the education technology space in South Africa, and is working hard to shift the popular belief that technology can fix education inequalities by replacing teachers with cheap devices and software. During conferences, interviews and meetings, SPARK continuously emphasizes its philosophy about using technology to drive student achievement in conjunction with high-quality, value-driven teaching. As Bridge has grown, the company has also expanded its monitoring and evaluation efforts, as a way to build a case for its model and associated use of technology.



## One Laptop Per Child - A programmatic approach to rolling-out affordable tablets, at scale

### OVERVIEW



The One Laptop Per Child (OLPC) initiative, established in 2005, sought to challenge leading entrepreneurs and industry leaders to develop a US\$100 laptop that could enable the provision of technology to every child on the planet. The initiative was a response to the digital and technology gap that exists for many young people in the developing world.

OLPC saw that what children lack is not capability, but opportunity and resources. To this end, OLPC designed hardware, content and software for collaborative, joyful, and self-empowered learning. They designed the XO Laptop, combining an interface that graphically captures a collaborative community of learners emphasizing connections among people, and their activities, with an ultra-low-cost, powerful, rugged, low-power, ecological hardware design.

OLPC takes a programmatic approach, working with governments and private foundations to provide 1:1 access for students in a particular region or country. From Uruguay to USA, and Peru to Nicaragua, OLPC has had mixed success in achieving its access goals and improving learning outcomes.

### KEY FEATURES OF OLPC



The robust XO Laptop was designed collaboratively by experts from academia and industry to combine innovations in technology and learning.

- The price per laptop is dependent on local needs and local capacity but, as an example, in Uruguay the cost to the state was US\$260 per child, including maintenance costs, equipment repairs, training for the teachers and internet connections.
- While the price of laptops has continued to fall to the price of the XO Laptop, OLPC argues that none of these have the product characteristics to be sustainably used by young people, especially those in developing countries.
- The initiative has five core principles that underline their ambition:
  - Children get to take the laptops home;
  - There is a focus on early education, and children aged 6-12;
  - Every child receives a laptop;
  - Connectivity; and
  - Free and open source software.

### IMPACT



- While a number of countries have aggressively implemented the One Laptop Per Child programme, there is a lack of conclusive empirical evidence on its effects on both access to technology and learning outcomes.
- There is evidence to suggest that the OLPC approach has had limited or no effect on numeracy and literacy, as in Peru and Uruguay (two of OLPC's largest deployments).
- Some positive effects of the OLPC programme were, however, found with regard to general cognitive skills and attitudes to learning.
- While the programme has been successful at increasing the ratio of computers per student – from 0.12 to 1.18 in Peruvian schools where it is being implemented (predominantly in rural settings) for instance – teachers reported decreasing usage as time went on.

### LEARNING FROM IMPLEMENTATION



#### Designing a bespoke programme with a local partner.

OLPC identify a local partner organization to work with their multidisciplinary team to design a bespoke programme, and to be responsible for day-to-day oversight of the programme in the longer term. This involves building a local team that is capable of providing various forms

of technical and operational support, to ensure the long-term sustainability of the programme. Inventory and maintenance systems are developed to overcome the logistical challenges of getting the laptops into the hands of each child.

#### Engaging the community and building local capabilities.

OLPC often looks to leverage universities or teaching colleges to provide long-term sources of potential trainee teachers who are tech-savvy, as well as volunteers in the community who can help with repairs and maintenance. Leveraging community assets supports the transfer of the knowledge and know-how required for the programme to be self-sustaining, albeit with some OLPC support. Generally, OLPC has learned that it takes a year to build sufficient local capacity, but acknowledge that this varies depending on the circumstances. OLPC recognizes that the programme requires investment upfront, but argues that this pays off in the long run.

#### Ongoing school leadership and teacher training.

Having focused too much on deployment, OLPC elevated teacher training to be a fundamental element of its implementation strategy. While each programme has a bespoke approach, they offer initial and ongoing training for up to five years (depending on the capability of local partners). To account for the varied quality of teaching, training is designed to be modular; providing access to the very basics as well as more advanced courses. It also involves skilling up teachers in innovation and learning strategies that also integrate technology. Pedagogical coaching is also offered, as well as the introduction of learning circles for peer-to-peer support. Importantly, teacher training is dovetailed with training for school leaders, who are expected to be as committed and capable as the teachers. OLPC therefore offers its leaders additional services such as curriculum mapping, mentoring, modules for engaging parents, leveraging technology for health and nutrition, as well as teacher observation, and giving targeted feedback for teachers.

#### From 'drop and go' to more sophisticated implementation.

In its early years, OLPC encountered significant criticism, with many pointing to the lack of impact on test scores, declining technology usage, and a lack of a direct relationship to the pedagogy needed in the local context. These failures were attributed to OLPC's initial and crude 'drop-and-go' strategy. OLPC learned from its mistakes and began to shift its approach to become more holistic, combining technology with prolonged community engagement, teacher training and local educational efforts and insights.

## CONDITIONS FOR SUCCESS



### A commitment to being hardware agnostic and having open source software.

OLPC is adamant that open source software is important and encourages children to take ownership of, modify and change the device based on the existing software. It continues to be determined to debunk the myth that schools need to have the best, newest and fastest technology, and advocates for devices that are purpose-designed for the context and the users that they seek to empower.

### Being open to a shifting strategy.

Through some hard lessons, OLPC came to realize the really important role that teachers play in the learning process. This led it to focus more on supporting the teacher and the community as part of the programme, rather than just deployment of devices. OLPC's openness to shifting from technology, to technology and teachers is critical to its evolution and the successes it has achieved. The realization that sustainability was critical has led to significant investment in community engagement and development.

### A commitment to ongoing initiatives that mobilize new technologies and capabilities.

In year three of the Ceibal Plan, an initiative in Uruguay that deployed OLPC's XO Laptops, a series of targeted education initiatives were launched, specifically to leverage the technologies that now existed in all Uruguayan schools. These initiatives ranged from adaptive mathematical platforms and robotics to remote foreign language classes and programming classes to assist 17-26 year olds to gain access to new employment opportunities. This represents a commitment to an open and shifting strategy.



## Mwabu: Tablet based e-learning and school improvement

### OVERVIEW



South Africa is one of the more advanced markets in Africa when it comes to education technology. However, in

some rural areas, one teacher is often responsible for teaching a class of up to eighty students using traditional 'chalk and talk' methods.

Mwabu's aim is to reach a hundred million learners by 2020. The focus is on rapidly improving the educational space in Africa by introducing e-learning resources for teachers and students. The programme offers interactive e-learning content aligned to local curriculums for maths, science and English – which is uploaded onto the Mwabu educational tablet – and professional development courses specifically created for African markets. The Mwabu Academy provides focused educator support and training to promote the use of technology in the classroom. Mwabu recognises that digital education is beneficial for learning, but believes that teacher acceptance of the technology and training is critical for effective teaching. Part of what makes Mwabu unique is the depth of its enriched learning material, tailored for the markets in which it operates. The content is contextually relevant, developed in English and translated into nine local languages.

With plans to rapidly develop the local e-learning scene, Mwabu is expanding its education solutions and academy services by increasing the number of languages into which its content is translated. It is working towards delivering high quality e-learning content across multiple countries, which will include a range of new educational approaches such as games, interactive immersive technology and formative assessment. Plans are in place to deliver SMS text messages to parents with the intention of engaging learners informally in the home.

### KEY FEATURES OF MWABU



- Primary teachers – irrespective of training or experience – access comprehensive, contextually relevant digital lesson plans, interactive lessons and teacher tips using the Mwabu tablet.
- The Academy provides enriched learning for teachers through training and observation visits, as well as the development of action plans.
- An intelligent interconnected network of teachers, learners and parents, who share best practice with each other, provides long-term support.
- The Mwabu tablet is used as part of a three-rotational model that divides classrooms into smaller working groups: each student is engaged in technology-led, teacher-led or self-led learning in each lesson.
- On average, the cost of delivering content and tablet devices (excluding training and solar panel requirements) is between US\$1 and US\$2 per child. At scale this can be less than US\$0.50 per child.

### IMPACT



- Mwabu has provided educational tools to more than 500,000 learners in Zambia since 2013.
- Mwabu currently offers nine local languages in Zambia for Grades 1-3. In South Africa, content is currently produced in English, but plans are underway to introduce multi-language content, including Zulu and Afrikaans.
- Mwabu uses Early Grade Reading/Mathematics Assessments (EGRA and EMRA) to evaluate attainment levels, with results consistently showing significantly higher improvements in learning outcomes for pupils learning with Mwabu than in other local schools.
- Evidence shows that numeracy skills are 16 per cent better after one year of using Mwabu lessons, than for a control group.
- Impact studies of Mwabu classes show that teachers deliver more engaging child-centred lessons, with 50 per cent of teachers using songs, games or stories compared to 25 per cent in the control group.

### LEARNING FROM IMPLEMENTATION



#### The barriers to entry are low in terms of cost and practical arrangements.

Readiness to use hardware is assessed prior to implementation of the Mwabu solution. Site surveys determine the limitations of implementation by assessing power and connectivity levels. Power is essential for charging and storing the tablets. However, if schools have no or little access to power alternatives such as their capacity to install solar panels can be considered.

#### Community buy-in is obtained.

Before the Mwabu approach can be implemented, parents must be informed about how it relates to education. In rural areas, parents can be sceptical of the technology and must be persuaded of the role technology can play in serving students and teachers. Stakeholder support (school leaders, teachers, union groups and parents) is important to ensure teachers that they are not working in isolation and to sustain momentum among teachers and students.

#### Five days of training for staff to engage with the technology and pedagogical approaches.

Before the Mwabu programme is initiated, the principal receives a full day of training, three days are allocated to the teacher(s) and a full day is allocated for the newly appointed coordinator, who acts as the intermediary between the school and Mwabu. Coordinators are also responsible for assisting teachers to use the tablet and

provide Mwabu with feedback about implementation and general use. Training topics include utilizing the tablets in the classroom, the three-rotational model (where learners explore through understanding, analysing and solving a range of tasks in groups using the Mwabu tablet, individually or with the teacher), and change management.

#### Continued pedagogical training, change management courses and an interconnected network of support.

Schools are allocated a mentor from the Mwabu Academy, who offers in-person or virtual training using social networks. Training and change management courses develop teacher capacity to confidently practice new teaching methods using technology. Mwabu encourages the delivery of in-person and observational training, as schools are using the technology for the very first time. Managing change is vital for continued use. The mentor service is an additional cost to the school and recommended at least three times per year.

## CONDITIONS FOR SUCCESS



### Content is contextually relevant and aligned to the local curriculum.

Mwabu have found that students disengage if content is not related to context. To ensure that content is engaging for students, Mwabu has local contextual specialists who focus on culturally specific elements of the content. Because many teachers struggle to access the whole curriculum and/or subject knowledge is weak, Mwabu works with local education departments to access curriculum content, certain parts of which are pre-loaded on the tablet to alleviate time pressure.

### Invest in powerful agents of change, as they are critical for continued use.

Mwabu appoints an agent of change – the 'coordinator' – who can be a head teacher, teacher or parent. The coordinator remains committed to and immersed in the effect that the technology is having in the school: and believes in its purpose and continued use. Mwabu recognizes the importance of investing in these individuals, using incentives such as remuneration or status. Coordinators based within the school are available for teachers to acquire proficiency to know when and how to utilize the technology in the classroom. Mwabu stresses that in order to have a better learner, you need a teacher who creates an environment that supports better learning, and ultimately creates learners that are self-sufficient.

### The bigger the belief base, the harder it is for teachers to work in isolation.

Building capacity and understanding in the school's

leadership team is critical for success, but remains a challenge for some schools using Mwabu. Without top-down buy-in, maintaining momentum becomes difficult. Teachers using technology for the first time should be visible to the school and feel supported. Training for principals is being redesigned so they are able to see what success looks like in the programme, in order to ensure that the school moves forward.



## School in the Cloud - self-organised learning environments

### OVERVIEW

In 1999, Sugata Mitra's pioneering 'Hole in the Wall' experiments helped bring the potential of self-organized learning to the public's attention. Research continues to support his conclusion that groups of children with access to the internet can learn almost anything by themselves. In 2013, Sugata Mitra won the US\$1 million TED Award and built the ultimate School in the Cloud where children, no matter how rich or poor, can engage and connect with information and mentoring online. There are now eight School in the Cloud Labs across the globe. The labs provide an environment where a global community of educators can observe the impact of self-organized learning on children from a wide range of educational backgrounds.

School in the Cloud is underpinned by Self Organized Learning Environments (SOLEs), which provide self-directed education to students in areas where high-quality teachers are not available. SOLEs and the School in the Cloud approach value learning outcomes that go beyond conventional measures, such as test scores. They are designed to develop 'softer skills' and dispositions such as teamwork, independent learning, presentation skills, confidence, critical thinking, questioning, deeper thinking and digital literacy. Proponents are clear that the SOLE pedagogy will not necessarily have any impact on helping students 'pass the test'.

SOLEs are not only for schools. The School in the Cloud also supports groups of learners in locations where there are no teachers. They utilize what is called the Granny Cloud: over 100 dedicated volunteers from around the world who Skype in to provide unconditional encouragement rather than outright instruction and guide children on their SOLE adventures.

### KEY FEATURES OF SCHOOL IN THE CLOUD



- SOLEs can be created by anyone, anywhere: by educators, parents or communities across the globe.
- An effective SOLE is a physical space in which students form small groups, each with access to an internet-connected laptop or computer (preferably with large screens so each student in the group is able to see).
- Students are given a 'Big Question' and the freedom to learn collaboratively to find the answer, using the internet. They work around a guiding set of rules that help them become a student-led learning community.
- These spaces are fuelled by self-discovery, sharing, spontaneity and limited teacher intervention. Teachers adopt a facilitative role: they stand back and give students space, then play a more proactive role during the presentations phase, a time at the end of a session when students share what they learned with the whole group.
- During a SOLE session students are free to move around, change groups and share information at any time.

### IMPACT



- SOLE experiments conducted in Uruguay, where almost every child has an internet-connected laptop, found that the children involved in SOLEs performed better when working on 'hard' problems in groups than they did individually.
- An experiment in the United Kingdom found that SOLEs had a positive impact on teaching practices in primary classrooms (for example, the opportunity to reflect on pupil learning led to higher teacher expectations of their pupils) and on pupil engagement in learning.
- Evidence and evaluation is continuously collated by SOLE Central - a global hub for research into self-organized learning environments (SOLEs) at Newcastle University, and is shared on the platform.
- There is evidence of students developing excellent searching skills, and being highly capable of summarizing the main findings of their enquiries.
- Evidence suggests that support for SOLEs from the Granny Cloud have led to improved comprehension and digital skills amongst children.



High school student taking a selfie outside his school in the town of Odienné in the northwest of Côte d'Ivoire.

### LEARNING FROM IMPLEMENTATION



#### Building a vibrant and global community of practice.

The ambition of the platform has been to build a community of self-organized self-organizers. It acts as a source of evidence, tools and processes to support experimentation and implementation of SOLEs. While the online resources offer structures and pathways to support learning, the general philosophy is that support needs to mimic the model of learning that SOLEs embody. Therefore, educators pursuing SOLEs are encouraged to experiment, reflect, learn and then share with others on the School in the Cloud platform.

#### Supporting educators to travel a journey.

SOLEs rely on a radically different teaching process, which requires educators to make a significant shift in mindset. In many of the contexts in which SOLEs have been adopted, teachers are conventionally seen as the ones with all the answers. In SOLEs teachers adopt a different role, which requires standing back and giving the students space. External implementation support is often necessary and, depending on the organization and the timeframes, sometimes takes the form of facilitated training programmes that are designed to mirror SOLEs. School in the Cloud is

cautious of the impact that one-off workshops can have in 'training' people how to do SOLEs well.

#### Winning over sceptics.

School in the Cloud reports that the on-site presence of a coach/expert/champion as most valuable for winning over sceptics (especially when this is Sugata Mitra). When this is too much of a logistical challenge, School in the Cloud will sometimes offer Skype conversations with schools that are experimenting, to discuss things that have gone wrong and help teachers to adapt an approach that will work for them. Teachers are more often won over if they participate in a SOLE, self-reflect and consider how it might work for them in their context.

#### Technology that's solving a problem for teachers.

Authentic buy-in from teachers is more likely when SOLEs are responsive to what teachers are trying to achieve, or to a problem they are trying to solve. For instance, when teachers are looking to build 21st century skills rather than improve students' test-taking ability, they are more likely to be converted to the SOLE approach. Trialling the method as part of a topic and then extending usage once the teacher is confident enough is a good route to take, and some schools have used the SOLE at the start of a topic as a way of generating interest from students.

**Nurturing a developmental mindset.**

Educators are reminded that this is an ongoing experiment that will be difficult to begin with, but will evolve, for them and for their students. An effective strategy that some schools adopting SOLE have used to sustain a developmental mindset amongst staff is to bring teachers together every 3-6 months to talk about how things are going. Asking 'why?' over and over again has helped to fine-tune the approach to the school's specific purpose, and has given teachers the agency to make SOLE work for them.

**CONDITIONS FOR SUCCESS****Flexible understanding of the role that teachers play.**

In some cultures, teachers are seen, and see themselves, as the 'sage on the stage' - the deliverer of knowledge. This is fundamentally at odds with SOLEs. Unless teachers are willing and able to shift their perception of themselves, and adopt a new teaching role, SOLEs will be out of reach. Even in situations in which conventional teachers agree to adopt the SOLE approach, they often revert back to the norm.

**Head teacher support and leadership buy-in.**

To successfully adopt an approach as ambitious as SOLEs, teachers need the time, space and support to do so. If school leaders actively timetable for innovation and experimentation, teachers are more likely to engage with an idea like SOLE. Time is necessary but insufficient: teachers also need active, sustained and informed support - both day-to-day encouragement and support through school structures, e.g. how teacher performance is measured. Access to shared best practice or an active community of practitioners is also highly beneficial.

**Basic but fundamental infrastructure requirements**

The School in the Cloud offers guidance on both a minimum set up and an advanced set up of a SOLE. In doing so, it limits the barriers to entry for schools and teachers that are open to experimentation, while also giving them an idea of what high fidelity implementation of SOLE looks like, to help motivate them along their developmental journey.

**Simplicity.**

The simplicity of the SOLE approach makes it an attractive proposition for teachers and has allowed it to spread quickly and be successful in many contexts. Proponents argue that other innovative pedagogies make the mistake of being too complex, and too often this is off-putting for educators.



## ENEZA Education: An affordable mobile classroom

**OVERVIEW**

Africa is quickly becoming a mobile-connected continent (95 per cent of Kenyan households own a mobile phone), and this technological explosion is changing people's lives. A wealth of new opportunities are being created by this innovation, not least in education.

Founded by a US teacher and a Kenyan 'techie' in 2011, Eneza Education Limited provides mobile technology based education services in Kenya and other parts of sub-Saharan Africa. Eneza aims to lower barriers to quality education in some of the most remote parts of the world through some of the simplest technology available in those places: mobile phones. Its mobile platform gives students access to quizzes, mini-lessons and tips and tricks via the web, mobile web, and text messaging. The emphasis on text messages enables users to continue learning even if they cannot afford to pay for data or expensive handsets, or if there is no data network in the area.

Eneza's vision is to be the global go-to learning platform that empowers the next generation of leaders with the skills they need to succeed. Their ambition is to provide 50 million learners with affordable quality education for a subscription of US\$5 a year, to be paid for by individual parents, students or teachers (the current price is US\$20 a year for a basic SMS subscription).

**KEY FEATURES OF ENEZA EDUCATION**

- Students access lessons aligned to the local curriculum, tutorials, Wikipedia, tips and assessments through USSD/SMS, an online Web app, an offline desktop app, and an Android app.
- Interaction between student and teacher is enabled through live teacher chat, and students can compete for places on leader boards through 'play&share'.
- The Eneza platform enables classroom teachers to see how their students are performing and to assign relevant homework.
- The platform also detects student progress and proposes what courses the students should take, based on their level of proficiency.
- Currently, schools can buy individual accounts for US\$180 per year that permit access to student data and teaching resources. Parents can request similar accounts for US\$15 per year.

**IMPACT**

- Eneza currently has over two million registered users and 142,000 active users per month.
- The platform currently operates in four countries - Kenya, Ghana, Tanzania and Zimbabwe - with imminent plans for launching in Zambia, Cote d'Ivoire and South Africa.
- Over the next few years, Eneza will further expand its reach into Uganda, Rwanda, Senegal and Egypt.
- A partnership with Safaricom, Kenya's largest mobile phone service provider, has enabled Eneza to bring subscription prices down towards its long-term goal (US\$5 a year).
- Impact studies carried out in 2012 and 2014 found that use of Eneza increased students' test scores by around 9 points (out of a maximum of 500) more than students in the control schools.

**LEARNING FROM IMPLEMENTATION****Implementation is simple, since no infrastructure is required.**

The 'bring your own device' model is vital for implementation on a large scale, as Eneza does not distribute any mobile devices: all students and teachers that want access to the platform must have access to a mobile phone, tablet or computer. Mobile phone content can be accessed offline, even if there is no internet connectivity available.

**Leveraging the power of SMS technology.**

Eneza's goal is to develop content for devices that people have access to and are familiar with using, and so its content has been primarily designed for mobile phones. As the price of smartphones decreases, there is a growing trend among users of changing from feature phones towards smartphones, so Eneza is now shifting focus to designing content for the android and developing various applications. The technology has also been developed to be interoperable across devices.

**Design is informed by teachers, which makes the platform highly intuitive and user friendly.**

The platform was co-designed with input from teachers themselves, to ensure it is user friendly. Eneza offers a single course for teachers with instructions on use of the platform and guidance on ways to interpret student outcomes. Besides the course, no other specific training for teachers is required.

**Partnering with mobile operators creates benefits for both parties.**

Eneza uses technology that major mobile operators have access to, which means that operators are able to increase their revenue streams by selling more services, and Eneza's reach of users subscribing to the platform has grown significantly. This close collaboration with the telecommunications industry enabled Eneza to lower the price of its data, in order to make it accessible to users.

**User engagement strategies are pivotal to successful implementation.**

Finding reliable ways to attract students to the platform, and keep them engaged, has been one of the main implementation challenges. Eneza ran campaigns and radio advertisements targeted at their key market, and encouraged parents to relinquish their mobiles so that their children could engage in learning. Convincing parents to add credit to the phone is key, since the platform runs on mobile data. Retention of users is a particular issue: of all the enrolled users paying for the product, only a third remain active on the platform the following year. To try to address this, Eneza set engagement targets for students, who are rewarded with free time once goals are achieved.

**CONDITIONS FOR SUCCESS****A model for tailored and authenticated content creation.**

One of Eneza's main advantages, compared to its competitors, is its content creation model, which ensures that content is aligned with the national syllabus of every

country in which it works. Every time Eneza enters a new country, a group of freelance teachers produce a content map and lesson units based on national standards. This content is then certified by a relevant local authority.

#### Parental support is an essential precondition for take up.

It is largely parents who make choices about their children's education, particularly when they are younger and, in general, the younger the student the closer the relationship between teacher and parent. Eneza's courses target students aged around 10 to 18 years, but also cater for persons who have dropped out of school up to the age of 25. The product is most effective in environments where parents are dissatisfied with public schooling but are not able to afford private schooling. The optimum demographic for Eneza's implementation has proven to be the ambitious, lower-middle class, in which parents are encouraging their children to climb the social ladder



## Onebillion: Adaptive android apps

### OVERVIEW

Onebillion is a UK-based charity that aims to reach one billion children in developing countries. Its mobile and tablet apps have been designed to progressively develop children's knowledge of early mathematical concepts (such as count to 10 and basic times tables) and reading and writing skills. The app sets out to teach modular, curriculum-appropriate numeracy and literacy with no direct adult support, making it a suitable tool for schools with high student to teacher ratio. Onebillion is also a finalist in the \$15m Learning XPrize.

The 'onecourse' numeracy material is curriculum-aligned

and available for download on the App Store and Google Play in fifty different languages. Reading is still in the works to become a standalone app and is being developed in Swahili, English and Chichewa, with more languages to follow. The apps are currently being used by approximately 100,000 children worldwide, including Malawi, Uganda and India. Notably, 20,000 of those are in a monitored trial in Malawi, in conjunction with Voluntary Service Overseas (VSO).

### KEY FEATURES OF ONEBILLION

- Onebillion has set up 'oneclass' learning centres where local teachers teach the entire maths curriculum to young children in their own language.
- The child is instructed by a virtual teacher who guides them through and provides feedback on modular courses which allow for personalised learning using animation and audio.
- Data is fed back to teachers who are trained to interpret it.
- Each Onebillion app has been broken down into a set of three activities: the study zone (where learning takes place), the play zone (where children compete with others and create their own learning content), and a set of bedtime stories.
- Oneclass can be powered by a low-cost renewable solar energy system.

### IMPACT

- Research undertaken by the University of Nottingham shows early maths concepts that used to take eighteen months to learn is now accomplished in six weeks.
- Onebillion partnered with VSO to launch the Unlocking Talent Initiative that aims to sustainably scale quality education to Malawi and beyond that now forms part of Malawi's formal education system. A goal of Unlocking Talent is for each of the 5,300 primary schools in Malawi to have access to a Onebillion app.
- By the end of 2017, the Unlocking Talent initiative will reach 50,000 Standard 1 and Standard 2 learners every week, providing students with access to Onebillion's 'onecourse' numeracy and literacy app.

### LEARNING FROM IMPLEMENTATION

#### Infrastructural requirements prior to implementation.

Onebillion's 'oneclass' technology consists of a dedicated solar-powered classroom that provides a sustainable environment for pupils in remote areas, with limited infrastructure and resources, and no access to electricity.

Products include a solar-powered projector, tablet, media streaming device, speakers, long-life battery and all associated cables. Local partner organisations in Malawi and Uganda are responsible for the construction of 'oneclass' centres, using sustainable building materials.

#### Hardware and software Choices.

The content used is media rich and tactile with the emphasis on engagement rather than passive consumption. Pupils are encouraged to swipe, drag and click constantly as they work their way through the activities. Badges and level graduation are common occurrences to keep children engaged. Audio is also used extensively for two reasons; firstly, to begin with many of the learners cannot actually read. Secondly, it allows for other users to listen in and engage just via the audio. The hardware is also locked down so there are no distractions - pupils cannot close the app and play Angry Birds instead.

#### Ignoring the curriculum.

Onebillion has also taken a very different approach when it comes to the scaffolding of its content. Unlike most other initiatives, Onebillion have chosen to only follow the route that leads to best learning outcomes. This often requires them to move away from the national curricula. This is only possible because they are not working directly with teachers - they work with the pupils. They are expecting to see resistance to this position when it comes to a wider roll-out but hope that the efficacy of their product will outweigh wider political concerns.

### CONDITIONS FOR SUCCESS

#### A complete focus on the learner.

This is actually a subtle but profound difference from the vast majority of other learning products. All claim to be learner focused but actually the customer is either the school or parent, this naturally skews the design. Onebillion's approach removes much of the friction often found in ICT for learning deployments as there are no levels of proxy to navigate. Teacher capability is not a factor, neither is curriculum adherence nor is the politics of education. Longer term this could also be a limiting factor for them, but for now, this laser-like focus is paying dividends in terms of creating a product that actually works for the learner.

#### A flexible, and mission-driven business model.

Onebillion sell their app in developed markets (UK/US), and uses the revenue generated to subsidise their charitable work. As this only partially covers the costs, they rely on grants and their endowment to pay for the roll out via VSO in places like Malawi. In the longer term, Onebillion plan on selling their app into NGOs and governments. This does

allow them right now to be very focused on exactly what will work for the child, not what will necessarily sell into schools or parents.

#### An Agile approach.

Onebillion maintains that solving the problem of primary education in the developing world is "...a moon-shot. No-one knows really how to do it. Any grand vision is bound to fail and that the only way to succeed is to be agile and test everything, adapting as you go" - Andrew Ashe, CEO. Onebillion puts particular emphasis on the importance of having people physically on the ground next to the learners, observing and testing new approaches constantly. Alternate versions of lessons are presented to different cohorts and the efficacy of each measured and the product adapted accordingly. This happens almost daily.



AGA KHAN FOUNDATION



## AKF and Dubai Cares: Transforming teaching and learning through ICT

### OVERVIEW

The transforming teaching and learning through ICT project is a partnership with the Governments of Kenya and Uganda and locally based innovative ICT and mobile companies to test and demonstrate the transformative potential of ICT to strengthen teaching and learning in formal primary education, using mobile phones and computers. As the focus on education shifts from Education for All (EFA) to Learning for All (LFA), the role of the teacher remains critical.



◀ Twelve-year-old Waibai Buka (second left) teaches her friends how to use a computer tablet provided by UNICEF, at a school in Baigai, northern Cameroon, Tuesday 31 October 2017.

## KEY FEATURES OF THE AKF AND DUBAI CARES INITIATIVE



Over the past three years, AKF, Elimu, and Camara have been working to:

- Provide hardware in schools including computers, tablets, and projectors
- Develop content aligned to the government curricula to support the teaching and learning of early grade literacy
- Deliver teacher and government professional development programmes to support the effective integration of ICT into teaching and learning
- Provide a mobile app to support communities of practice that go beyond the school or immediate clusters
- Develop an app to support teachers and schools to more efficiently collect, store, analyse, and use data to make information based decisions to support effective teaching and learning.

## IMPACT



- 1,404 (M:840; F:564) teachers have been trained on how to integrate ICT into their everyday teaching and learning practices.
- 94 Trainers (M:59; F:35) selected from Inspectors of Schools and Curriculum Support Officers continue to support teachers through mentoring and coaching on how to integrate ICT into their everyday teaching and learning practices. Over 1002 (M:339; F:663) teachers have been mentored and coached by these trainers to date.
- 39,332 (M:19,386; F:19,946) children across 175 schools have engaged with ICT in the classroom using devices provided by the project.
- Under this project, AKF conducted a human centred design process to develop a tablet and mobile phone based school management system to enable schools and teachers to track whether children enrol, attend, transition, and are learning. Designed to reduce the workload of teachers and provide instant analytics and feedback for teachers and schools to better understand what the data are telling them.

- Digitalised stories have been developed by teachers and parents from these regions and curated by AKF. These stories have been built into an interactive platform that has incorporated questioning and other supports to enable children to effectively engage with the story to develop literacy skills. The stories can be used by teachers in the classroom or in the home through an android app. And over 50,000 downloads have been recorded to date.

## LEARNING FROM IMPLEMENTATION



### Support teachers to navigate the resources available

There is a lot of content around, but much is not aligned to the curriculum, not age/developmentally appropriate, or relevant to the context. As such, teachers can find it difficult to identify the resources appropriate for their students and relate these to their classrooms. This project has developed content for teachers that was directly related to the curriculum. While this lengthened the process for developing the content, what has been produced is relevant to the national context, rather than being contextualised from global content. This enables teachers to make concrete linkages between the content and the curriculum and so enables them to use ICT with confidence and integrate ICT more meaningful into their teaching and learning.

### Maximise the power of ICT

Much of the content, particularly those aligned to the curriculum, are not interactive, even to the extent of being PDF. This reduces a tablet to an electronic book. The content developed under this project required learners to engage with the platform and the content as well as supported the teacher to construct appropriate and relevant questions to enable effective learning.

### ICT is more than just a computer

When considering ICT, it is important to consider the associated costs. These include maintenance, electricity, software updates, and internet fees to name a few. The inability of schools to meet these costs has the potential to undermine the ability of teachers to integrate ICT into teaching and learning. Close collaboration between government, schools, and communities is needed to mitigate against this issue for long-term sustainability.

### ICT can be a disrupter and so considered a threat

Teachers can be threatened by ICT as it has the ability to disrupt existing power dynamics as children take greater agency in their own learning and frequently develop ICT literacy at a faster pace than teachers. This needs to be considered when developing teacher professional development courses so these explicitly support teachers

to face this fear and become confident in the use of ICT in the classroom.

## CONDITIONS FOR SUCCESS



### ICT interventions must be user centred

It is critical not to assume the everyday realities children, schools, and teachers face, but rather understand these from the user's perspective. When developing the App for the digital communities of practice, this was not fully appreciated and so the App has not had the expected uptake rate. Therefore, when developing the school data management App, AKF took a human centred design approach to ensure the App considered the needs and challenges schools face and was designed with the user at the centre. This has enabled the app to maximise the power of ICT, data and data analytics to track children's enrolment, attendance, transition, and learning.

### Supportive education ecosystems

ICT cannot be an input that exists in and of itself, but rather has to be integrated into the wider education ecosystem. Therefore, the more supportive the policy environment, investment, school level infrastructure, and school management, the more effectively ICT can be integrated into everyday teaching and learning. This education ecosystem also needs organisations, institutions, government departments and other stakeholders to work together and partner as no one of these can do it alone. Under the project, for example, the Government of Kenya has provided the policy environment, the infrastructure, and frameworks, AKF the system support, professional development, and community engagement, Elimu, the interactive content, and Camara, hardware and ICT support. It is clear that no one could have achieved all. In Uganda, where both policy and investment are far behind, the overall impact is not as deep or broad clearly illustrating the need for effective and supportive partnerships deliver better results.

### ICT aligned to the system

Aligning ICT to the requirements of the system enables teachers to meaningfully integrate ICT into learning. This is, perhaps, most prominent in content (see learning point one) as well as with teacher professional development. Alignment helps teachers to see how ICT can support them to develop the competencies they need and enable them to effectively use ICT to develop student competencies as outlined in the national curricula.

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Innovation Unit, Aga Khan Education Services and the Aga Khan Foundation were commissioned to complete this report by UNICEF Eastern and Southern Africa Regional Office and West and Central Regional Office.

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For readers wishing to cite this document we suggest the following form: Innovation Unit, Aga Khan Education Services and the Aga Khan Foundation (2018) Raising Learning Outcomes: the opportunities and challenges of ICT for learning. UNICEF Eastern and Southern Africa Regional Office and West and Central Regional Office, Nairobi.