EdTech

Clear evidence, better decisions, more learning.

EdTech and Covid-19: Insights from our Sandbox Portfolio
In Collaboration with Sandbox Partner Organisations

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About this document

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Notes

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Introduction

The Covid-19 pandemic is good for one thing: keeping people apart. The social consequences are far-reaching, particularly in education.

Although EdTech Hub was not created to help educators deal with the pandemic, we've had to rapidly pivot our efforts to do exactly that.

We've found that conducting fast-paced, iterative experiments in the real world has been a valuable way of learning. We call these projects Sandboxes. Between June 2020 and March 2021 we completed five Sandboxes, each responding to school closures caused by Covid-19. They were designed to rapidly test promising EdTech interventions, using a mix of funding, support and access to evidence. Each was an opportunity to try out new ideas at a small scale and see how they actually work for real students, teachers, and other participants.

In this report, we've written up our high-level conclusions, based on what we've learned so far. All insights featured in this report are based on the great work done by our Sandbox partners.

Figure 1. *Children in northern Uganda learning via the radio. From our Sandbox with Mango Tree Literacy Lab.*

Our approach

A Sandbox fast tracks promising EdTech interventions by providing funding, tools, and access to evidence. It provides a space for partners to test and grow ideas in conditions of uncertainty.

We break Sandboxes up into short sprints, learning and iterating as we go. Each sprint informs changes and new ideas for the next.

The term itself comes from software engineering. It's used to describe a space that allowed developers to test new code before rolling it out across the board.

You can read more about the approach in this blog post (⬆Simpson, 2020), and more about our precise offer in this 2-page handout.

Our theoretical framework: the 6 Ps

When technology is introduced into education systems, it does not exist in isolation.

We see 'EdTech' as only one part of a solution, existing within a broader system of factors that need to work together to make impact at scale. Throughout our work we push ourselves to consider the full breadth of the education system, and what it would take to really improve learning outcomes for the most marginalised.

In order to consider how an EdTech programme might perform within an education system, we have developed a framework that considers six key aspects of the education ecosystem (6 Ps) with which any EdTech tool must engage and integrate to be successful: people, product, pedagogy, policy, place, and provision.

For that reason, the takeaways in this report are structured against the six Ps.

Figure 2. *6 Ps: a framework for considering the education system.*
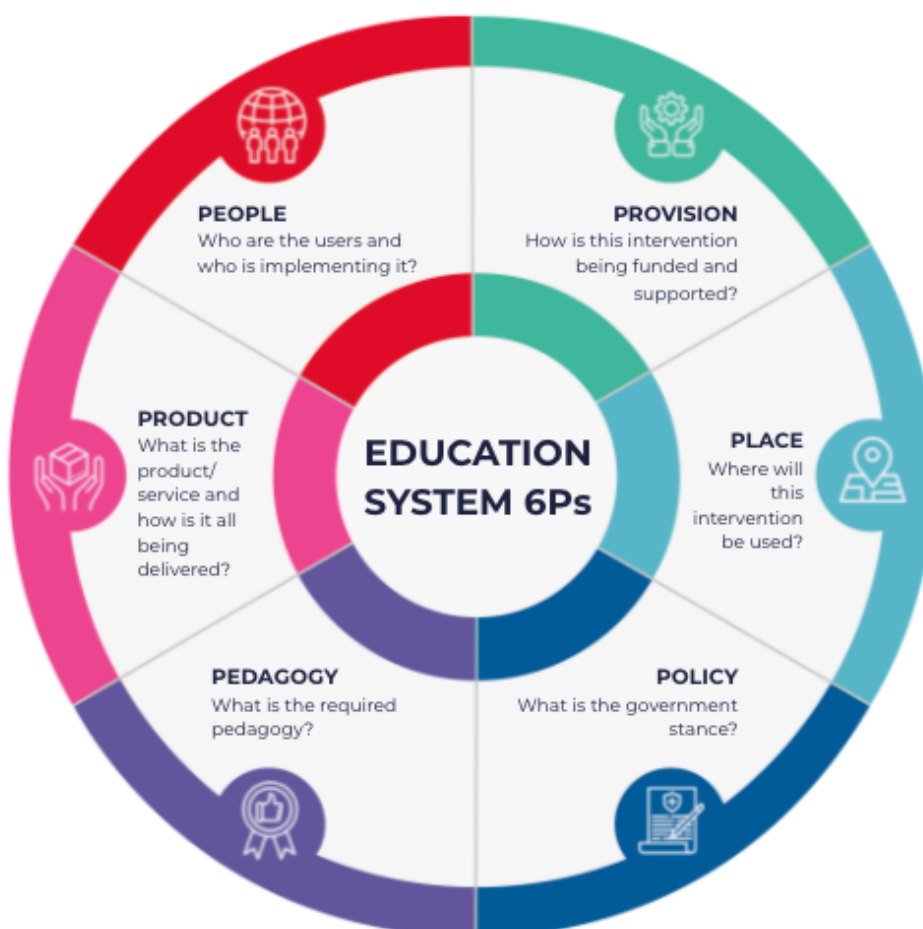
The key insights

People

- Meeting people's needs with EdTech requires a rich understanding of their context and whole experience.

- The more you involve users and participants in the design and implementation of an intervention, the more successful it's likely to be.

Product

- EdTech enables, connects, and works alongside people: it doesn't replace them.

- Technology is never enough on its own; design the service and human interactions that wrap around it.

- When working with the lowest-income groups, ensuring equitable access to technology is crucial.

Pedagogy

- Instruction should adapt to make the most of the unique advantages technology can offer.

- Education provision needs to meet students where they are, sometimes filling non-academic needs first.

Policy

- Governments are important for scaling good ideas but get them involved as early as possible.

- Ideas seeded in an emergency response can be pivoted to long-term integration with the existing system.

Place

- Adapt your intervention based on the resources and infrastructure that exist from place to place.

- Physical environments will have an impact on learning, so it's important to design for them.

Provision

- What combination of funding models would enable sustainable interventions to reach the most marginalised?

Summary of our five Sandboxes

Below we provide a brief description of each of our Covid-19 portfolio Sandboxes, including each of their relevant hypotheses to be tested through rapid experimentation and iteration. A more detailed description of each can be found in our Sandbox overview website. As we discuss insights from this portfolio in the report, we will use the lead partner's name as shorthand for each Sandbox.

Headline	Making teacher presence felt – testing a telephone helpline in Afghanistan	Sending school to children – sign language videos on laptops in Pakistan	Radio in the community – making radio work better for children in Uganda	Using WhatsApp as a classroom – WhatsApp-based learning for refugee children in Lebanon	Helping caregivers foster learning at home – understanding needs in Kenya
Hypothesis	If we introduce a free telephone helpline to connect girls and teachers during school closures, then learners will be better motivated and able to engage with educational content so that dropout is prevented and learning continues.	If we create digital content in Pakistani Sign Language (PSL) and provide it to students via laptops, then they can continue pursuing learning goals at home so that knowledge gains in core subjects continue and language erosion is prevented.	If we deliver radio lessons alongside supplemental materials and in-person facilitation, then we can teach literacy in local languages to primary-age children while schools are closed so that they achieve meaningful literacy competencies.	If we provide instructional content via WhatsApp to out-of-school refugee primary-age learners, then they can continue learning through school closures so that they have a greater chance of accessing formal education in the future.	If we use tech tools (SMS, video, etc.) and community meetings to provide education guidance and resources to caregivers, then we can raise their awareness of the importance of learning at home so that they engage more meaningfully in children's learning and help foster improved outcomes.
Lead Partner	brac	Deaf Reach Schools | Training Centers | Colleges	MANGO TREE LITERACY LAB	JUSOOR	KEEP KENYA LEARNING

What do we mean by 'rigour'?

The Sandbox methodology approaches the 'rigour' question slightly differently than academic research or program evaluations might. In Sandboxes, the team thinks of small iterative ways to get feedback on particular aspects of an intervention. We collect just enough data (no more, no less) to test a specific idea or assumption to take us one step forward in our program development.

For example:

- We might ask 30 caregivers in Kenya about their engagement with learning at home, simply to gut-check our intervention design with those who might use it and get some early feedback.

- We may conduct an A-B test on a laptop dissemination model with a couple of hundred learners in Pakistan to determine whether an added mobile connection would further relationships between teachers and learners in one school, with hopes of having that inform whether that model is suitable for expansion / worth the cost.

What this means is that our findings at each step of the way are not meant to be generalisable across interventions or contexts. They are simply meant to help the programme implementer make decisions about their own model and how to improve it on their way to scale.

With that in mind, how should the evidence we are presenting be utilised by those hoping to learn from it? There are a couple of ways:

Sandbox evidence is to be adapted: We hope the themes we present provide adaptable insights to practitioners, policymakers, and EdTech funders currently implementing their own EdTech programmes. So rather than follow our takeaways by the letter, we hope you'll take them as themes that five teams of like-minded innovators came across as they implemented their programmes, and therefore consider how / if they might be relevant to your own challenges.

Learn about learning: We hope the insights and evidence drawn from our five Sandboxes help others better investigate their own programs and take their implementation models to the next level. Learning from interventions is not something that should be limited to evaluators, and implementers themselves have the power to collect data in a way that is valuable to their programme design, implementation, and growth.

What we learnt

From here, we outline our key insights. Each insight has a short explanation, followed by a series of in-depth examples from our Sandboxes (in grey boxes). The insights are framed by the 6 Ps, starting with people.

People

Who is using the technology? Who is implementing the programme? Who will benefit from it? How should these people be considered when designing EdTech programmes?

Meeting people's needs with EdTech requires a rich understanding of their context and whole experience

We know that starting with user needs is critical to designing impactful programmes. In the words of the UK government design principles (↑Central Digital and Data Office, 2019), "if you don't know what people's needs are, you won't build the right thing".

This is particularly challenging when needs are so intertwined, and when Covid-19 restrictions on movement and school closures mean there is little separation between education and other parts of family life. Across our Sandboxes we saw how critical it was to understand everything people "have on their plate" that might impact their education experience and to not make assumptions.

Two particular aspects of people's whole experience were important. Firstly, how learners view and interact with educational resources. For example, how comfortable are they using EdTech? Can they relate to it? Is it designed to meet learners' needs? And secondly, are the needs of caregivers — often the gatekeepers of children's access to EdTech — accounted for? What barriers might they need to overcome in order to support their child's learning?

"We focus on local language to ensure we're engaging communities on their terms. Equitable engagement goes hand in hand with power, dignity, and local ownership"

– Craig Esbeck from Mango Tree

Evidence from our Sandboxes:

Deaf Reach: Most parents of Deaf Reach learners felt limited in their capacity to engage in their child's education: although the majority of them (87%) were willing to help their child, only 47% self-reported as "definitely capable" of doing so. Our Sandbox team noted that meeting this need is crucial to sustaining learners' engagement. Parents were also apprehensive about aspects of the EdTech intervention, for example, the costs of charging devices and how to do this during electricity cuts. Many had to take devices to nearby shops to charge, which was perceived as a major hassle to an already overworked parent.

To support parents, Deaf Reach invited both parents and learners to day-long onboarding sessions before providing the laptop and smartphone. In these sessions, Deaf Reach oriented both parents and learners towards utilising the tech provided and tried to address any potential barriers to use.

Jusoor: When Jusoor set up WhatsApp-based learning for children in refugee camps in Lebanon, the engagement in the programme varied massively. In order to understand why children weren't always engaging, we conducted a survey of families in three refugee camps in Lebanon. Parents told us that the biggest barriers were limited access to devices and data (68% having only one phone per household), and financial constraints (39%) meaning children had to work.

To test the best ways to alleviate these barriers and help children resume education, the Jusoor team offered families a no-strings USD 25 cash payment and monitored the impact on attendance of children. We found this small cash payment increased children's engagement by 8%. Meanwhile, the parents that used the cash to rent a mobile device or buy data saw a significantly greater increase (28%) in children's engagement in the programme.

Keep Kenya Learning: From its inception, KKL knew that they would need to provide caregivers with resources that would support them in facilitating learning at home. Yet before ever sending them a worksheet, the team decided it would be wise to first understand a bit more about caregivers' current needs and challenges in engaging with education. In partnership with Busara, the KKL team conducted qualitative interviews and behavioural mapping of 30 Kenyan caregivers across three persona types.

Among their findings, the team found that a majority of rural and urban low-income caregivers consulted dropped out of school at the primary and secondary levels, and therefore found it difficult to answer basic questions

from their children. This led to a general lack of confidence in supporting them to learn at home. It became clear that the original plan of simply sharing learning resources with caregivers would not meet their needs, and that the initiative should first focus on using EdTech tools to raise caregiver confidence and awareness about the importance of their role in education.

The more you involve users and participants in the design and implementation of an intervention, the more successful it's likely to be

Co-creation of tools directly with users has long been standard practice in the tech world. "Design with the user" is the first Principle for Digital Development (also see: ⬆REAL Centre, 2018). However, bringing learners, teachers, and caregivers in on the ground floor in developing educational interventions is a relatively novel concept. It resonates strongly with EdTech Hub's call to "build learning teams" (see: EdTech and COVID: 10 Things to Know).

Each of our Sandboxes took care to consult with users early on, and in some cases worked directly with them to co-create interventions. When communities are more engaged, the intervention is more likely to be valued and effective: direct feedback about what is and isn't working can help ensure long-term impact.

Figure 3. *A session with teachers to design a telephone helpline. From our Sandbox with BRAC in Afghanistan.*

As many Sandboxes also demonstrated, teaching and learning, especially during Covid-19, is the work of the broader community. Most of our Sandboxes required support from stakeholders beyond teachers and learners. Caregivers

and other community members were crucial to fostering learning at home, especially during school closures.

Sandboxes leveraged relationships and partnerships with trusted community gatekeepers and facilitators, building tools from existing assets and strengths in the community.

Keep Kenya Learning (KKL): In Kenya, our KKL partners understood from the beginning that consulting caregivers directly on the development of the resources that would help them facilitate learning at home was crucial. During Sprint 2, the KKL team brought drafts of their SMS message curriculum (intended to increase caregiver confidence and incentivise positive 'learning at home' habits) directly to caregivers for their feedback in focus-group discussions. The benefits were clear: the KKL team now has direct guidance from their target users pointed at ways to improve the tone, frequency, and timing of their messages.

Jusoor: In the refugee camps in Lebanon, the relationships with principals, teachers, and refugee families were vital in the design and implementation of the WhatsApp-assisted learning programme. Refugee families were asked to share their barriers to engaging with education, which informed an information campaign curated by Jusoor to send to parents.

The campaign focused on giving them practical tips on what they could do to help children learn at home, tailored to their circumstances. The principals and teachers (refugees themselves) were involved in recording and circulating the content. They highlighted the importance of providing voice notes as an alternative to videos to ensure families with limited data would be able to access the content.

Product

What are the tech components of interventions? How does the tech work and will it work at scale?

EdTech enables, connects, and works alongside people: it doesn't replace them

EdTech is at its most powerful when used thoughtfully to catalyse human exchanges (interpersonal teaching and learning), and not as a substitute for that interaction. Relatedly, while a product can be designed to disseminate resources and engage users as effectively as possible, facilitation from teachers, caregivers, or peers can enhance the power of tech.

Evidence from our Sandboxes:

Deaf Reach: Learning outcomes were enhanced when a deaf child had a bi-weekly call with a teacher, using a smartphone. For one month, we provided a smartphone to 100 deaf learners and found that these learners showed a 35% higher rate of improvement than learners who were only provided with a laptop and digital content. This shows the value of technology which enhances a teacher's connection to a child's learning journey, particularly in a scenario where parents (who in this case may not be well-versed in sign language) are less capable of supporting their child.

Mango Tree: EdTech Hub's work on radio suggests that while it is an inexpensive and reasonably effective way to deliver education for hard-to-reach communities, little is known about its effectiveness in out-of-school contexts. This Sandbox demonstrated that *combining* radio instruction with a co-teacher, typically an older sibling who could facilitate a group of 10–15 primary-age learners, led to improved learning outcomes. Over 12 weeks, children's average scores increased between 10–30% in assessments of key literacy competencies, including name writing, letter name knowledge, print awareness, and listening comprehension. From observational data taken from a subset of listening centres, two co-teachers were present at least 88% of the time. These insights corroborate similar insights about the importance of children being supported in their learning — ideally by a teacher, but otherwise by another facilitator, such as an older sibling (⇡McBurnie, 2020; ⇡McBurnie, 2020; ⇡Damani & Mitchell, 2020).

BRAC: This Sandbox began with a two-week 'helpline simulation', where 50 teachers were given phones to ring households of their pupils. These calls would supplement the radio, TV, and worksheets that a child also received. A teacher might provide instructional support, motivation, or support a child's socio-emotional needs. In total, 35–40 calls were completed each day over two weeks *per teacher* (i.e. the student answered the call). This demonstrates the extent to which the student valued the human connection they had with their teacher.

However, when the V1.0 helpline was rolled out, the number of calls completed per teacher dropped to just over three per day. Unlike the 'simulation', teachers and students could call each other. Students rang via a helpline number and were put through to whichever teacher was most suitable for their need. This wasn't always a teacher they had a prior relationship with. Indeed, most calls were between teachers and children who didn't know each other. The team believes this lack of relationship was a big factor in the lower call frequency, although other factors (such as the reopening of schools) also had an impact.

Technology is never enough on its own; design the service and human interactions that wrap around it

EdTech is often thought of in terms of products and one-off deployment, when in fact it should be thought of as a service needing continuous delivery, with consideration given to the end-to-end experience of those using it. As we say in ⇑Nine Takeaways from our reviews of Covid-19 education responses, hardware provision should always be accompanied by 'wraparound' support.

Emergent thinking in education provision similarly points to the importance of a coherent package of services (ie. teaching and learning materials, teacher training, teacher guides, and ongoing support) known as 'structured pedagogy' (⇑RTI International, 2021) in leading to improved learning outcomes.

Supportive services around a tech product are just as important. This might mean supplementary non-tech materials for learners, or campaigns to increase engagement with the intervention. While a poorly designed product will always fall flat, good product design alone is not sufficient. The 'wrap around' services and end-to-end experience is what gets us to sufficient.

Evidence from our Sandboxes:

Mango Tree: All of the supplementary materials in the Mango Tree Sandbox wrapped around radio programing — the guidebook for co-teachers, the radio script for the DJ, as well as local language storybooks and government literacy textbooks provided for learners — were instrumental in enabling the model to lead to improved learning outcomes in literacy. An overwhelming majority of co-teachers (over 90%) consistently used these supplementary materials, finding them useful in the facilitation of learners' engagement with the radio programme.

Deaf Reach: In addition to providing laptops to children, Deaf Reach also tested a range of 'wraparound' support to make that product effective. For example, before they were provided with the laptop and smartphone intervention, children and parents were invited to an onboarding session (in person) where they could engage with the technology with the support of Deaf Reach educators. Where possible, teachers dropped in at home to check in on how children were progressing. Smartphones were provided to 100 children and used for video calls to teachers twice a week. Children provided with a smartphone had 6% more engagement and were 20% more likely to be able to navigate the technology as compared with children only provided with a laptop.

Figure 4. *An onboarding session for children and parents. From our Sandbox with Deaf Reach in Pakistan.*

Jusoor: In order to maximise the impact of the WhatsApp-assisted learning programme, the Jusoor team have been exploring other elements of their 'service' offering. Jusoor tested ways to increase engagement with the remote instruction, including providing practical advice to caregivers on how to manage learning from home. While this campaign did not translate into a measurable increase in learners' engagement, 67% of parents found the advice helpful and said they adjusted their behaviour as a result.

Jusoor also offered families simple no-strings grants of USD 25. The money was theirs to spend however they wished, with the option to spend it on renting a smartphone or buying a mobile phone data package. We monitored the impact on engagement with the WhatsApp-assisted learning programme. Overall we saw an increase in engagement of 16%. We were able to dig into the data a little more and see the variations based on the choices they made — the cash-only option only saw an 8% attendance engagement, while combining both phone rental and data was the most impactful option with an increase in engagement of 28%.

When working with the lowest-income groups, ensuring equitable access to technology is crucial

EdTech interventions should take stock of and use tech that already exists, as argued in EdTech Hub's ⭫Nine Takeaways from our Reviews of Covid-19

Education Responses. Many of our Sandboxes are built on technologies already present in a household or community. For example the **Mango Tree** Sandbox used radios already present in communities in rural Uganda, and the **BRAC, Jusoor** and **Keep Kenya Learning** Sandboxes used both feature phones and smartphones that households already had. Doing so avoids significant issues around connectivity and installation, as well getting users used to new technologies. Particularly in low-resource contexts, introducing new hardware requires a significant investment.

In places where users and communities have little existing access to devices, introducing new devices or hardware is difficult, but necessary. For example, the **Deaf Reach** Sandbox provided laptops to children who otherwise would not have been able to access the video content.

> **"Our work simply would not have been possible if we did not provide children with laptops"**
>
> **– Sarah Shaikh from Deaf Reach**

As mentioned above, deploying technology should be done alongside a 'wraparound' service, and should enable or supplement (rather than replace) human connection. Rather than 'dumping' hardware, it is important to provide it carefully. This involves getting to know user needs and context.

Equitable access should be at the level of the learner, not the household. This distinction between household level of ownership and learners' actual access to those devices is echoed in other literature (see, for example: (⇡Uwezo, 2020). Both the **Jusoor** and **BRAC** Sandboxes encountered significant challenges in learners' access to the family's feature phone and smartphone.

Evidence from our Sandboxes:

Jusoor: WhatsApp is a well-established and very widely used communication tool among refugee communities. About two-thirds of the families in the Syrian camps in Lebanon own a smartphone (68% of respondents to our survey). Jusoor's initial decision to use WhatsApp for remote learning was simply a case of making use of what was already there. However, we found one phone per household was not enough, with the wage-earning parent often taking the phone out of the house. When Jusoor provided families with additional access to phones, data, and cash, the students that benefited most were those who previously had the lowest engagement (20% increase).

BRAC: For the telephone helpline, BRAC provided access to smartphones for teachers. However, children used feature phones already owned by their household. During the two-week 'simulation' of the helpline, a child's access to a phone and GSM connectivity were the largest barriers to take-up of the helpline. Given that the helpline reached 2,500 children, providing each child with a phone would have been very expensive, logistically difficult, and potentially created harmful consequences. As the helpline engaged 30–50 teachers, providing teachers with smartphones was more feasible.

Deaf Reach: Each learner was provided with a laptop, and after one month 95% were returned as before (no damage) while 85% of learners self-reported as finding the content easy to navigate. This dissemination of new technology would not have worked if learners hadn't been instructed clearly in the use of the equipment and had some previous experience with using it at Deaf Reach schools.

Pedagogy

How can tools and interventions be designed with sound pedagogical principles? How can we make sure it will meaningfully improve learning outcomes?

Instruction should adapt to make the most of the unique advantages technology can offer

Though all of our Sandbox interventions were built on evidence-based instructional approaches and curriculum from in-person teaching, each recognised the need to adapt when moving to online. This echoes the recommendation of EdTech Hub's Overview of Best Practice in Pedagogy for Remote Learning (⬆McAleavy & Gorgen, 2020), for remote learning not to mimic the teacher–student engagement of the convention school.

Teachers who must pivot from classroom teaching to remote learning or tech-enabled learning (as so many have had to do due to Covid-19 school closures) will likely need additional support in adapting to those circumstances. Here, implementers can learn from more holistic structured pedagogy approaches (⬆RTI International, 2021), which often provide teachers with additional training, supplemental materials, and detailed recommendations on how to structure lessons to make the most of their tech connection to learners.

Adaptation of instruction to tech can also offer some unique opportunities to shift traditional teaching practices and explore more interactive teaching. An assignment that originally may have been submitted on paper in the classroom can turn into a video, a voice message, or other creative output

when technology is used for remote learning. The power of tech to standardise certain components of instruction can also make it so that the *best* version of a lesson can be delivered to hundreds of learners over the radio, instead of being limited to the four walls of a classroom.

Evidence from our Sandboxes:

Jusoor: Building on existing relationships between teachers and students, Jusoor used WhatsApp to allow teachers to continue to communicate with their students despite school closures. Teachers used it to distribute assignments, and children used it to submit their work. In order for this approach to be effective, Jusoor first reviewed their curriculum alongside teachers to create a refined version appropriate for WhatsApp. In addition, they have been exploring the best approaches to teaching, including videos, voice notes, and creative ways for children to submit assignments with limited resources at home (for example, using stones to make letters on the ground).

Mango Tree: Mango Tree's Northern Uganda Literacy Programme (held in-person) had been shown in an RCT to raise reading scores by 1.2 standard deviations. Covid-related school closures led the Mango Tree team to pivot to radio. Mango Tree kept the pedagogical elements they knew 'worked' — such as slow-paced introduction of content, segmented lessons, and a focus on empowering teachers (including expert mentor teachers) — but translated this to working with 'co-teachers' (members of the community, often older siblings) and radio. Co-teachers were provided weekly support by learning centre coordinators (local primary school teachers) as well as a detailed guidebook that led them through learning facilitation.

Deaf Reach: in Pakistan, Deaf Reach could not just simply load their lessons directly onto laptops and send them to students. It was important to adapt them to individual learning at home. Videos created by DeafReach are 3–4 minutes long, which retains the attention of a child at home. The original, synchronous lessons in Deaf Reach schools had been between 30–60 minutes. Ahead of its second sprint, Deaf Reach spent weeks adapting content from its in-person curriculum for four subjects (English, Urdu, Maths, and Science) across grade levels 1–6. This included developing digital versions of lessons, as well as supplementary worksheets and materials for learners to complete as they worked through the curriculum at home.

Education provision needs to meet students where they are, sometimes filling non-academic needs first

It can be challenging to meaningfully engage in effective instructional approaches in low-resource contexts where often the infrastructure is not ideal, the time on task is limited, and learners face extensive barriers to focusing on learning —all made more challenging by a global pandemic (see, for example, ⬆Asanov, et al., 2020). We also note use of phone-based interventions in health (see, for example, ⬆Ippoliti & L'Engle, 2017).

Taking into consideration the current contextual pressures and socio-emotional needs — including non-academic needs — of learners, teachers, and caregivers is vital. For example, learners in the **BRAC** Sandbox were anxious about Covid-19, and many conversations with girls focused on this. In the **Jusoor** Sandbox, many children had to enter the workforce to supplement the family's income — a contextual pressure that has been all the more acute during Covid-19.

> **"Proper pedagogy can feel like a luxury in an economic and health crisis, where instruction of any kind is difficult to deliver. Our focus needs to be on core competencies that drive pedagogy designed to protect learning and well-being in crisis"**
>
> **– Deborah Kimathi from Keep Kenya Learning**

Evidence from our Sandboxes:

Throughout our Sandboxes, we have sought to support effective engagement with instructional content, by first meeting both teachers and caregivers where they are. For example:

KKL: In Kenya, our approach to supporting caregivers to facilitate learning at home pivoted from providing them with proven educational resources to first building confidence, community, and instilling in caregivers basic habits to catalyse learning at home. In partnership with Ubongo (an education content provider), the KKL team are creating TV adverts modelling examples of positive parenting behaviour at home. KKL's SMS curriculum, built alongside Scholé, incentivises caregivers to ask questions, tell stories, and encourage children to explore their environments. These basic blocks of learning will begin to build connections between parents and

their learners, meeting them where they are before asking them to go further in their engagement with more rigorous learning resources.

BRAC: During the two-week simulation, psycho-social support was the thing that teachers reported was most asked for by students. One of the most repeated topics of conversation was fears about Covid-19, and how to respond if a family member became ill. Partly, this is because of timing. The simulation took place in June 2020, when Covid-19 cases in Afghanistan were significant and rising. There is also a gender lens to this. All the users of the helpline were girls, who often take on a caregiver role in the family. As a result, we ensured all teachers using the helpline were trained in delivering psycho-social first aid, including basic guidance and information about Covid-19.

Policy

What is the impact of the broader policy environment? What is the government role in scaling EdTech?

Governments are important for scaling good ideas but get them involved as early as possible.

EdTech interventions seeking to build on to public provision of education to reach scale should reach out to government leaders early and often to ensure they feed into the design and early implementation process. In particular, bringing in government partners early on in an intervention helps to lend it legitimacy and ensure complementarity with the education system.

During times of crisis, such as the Covid-19 pandemic, resources for education provision can also be allocated quickly to reach learners in urgent need. This makes early, meaningful engagement important for innovators with promising EdTech solutions. If policymakers are brought into (and can contribute to) the early stages of an intervention (design process), they are more likely to trust its output.

Evidence from our Sandboxes:

Mango Tree: Mango Tree's existing relationship with district officers and other local education officials allowed them to quickly create a community infrastructure to support their radio programming, anchoring listening centres to government primary schools. In addition, the team's focus on making sure that radio programming was aligned to the national curriculum ensured that government leaders saw the initiative as complementary to government efforts, not a competitor.

Keep Kenya Learning: In keeping with the KKL's goals for scaling in Kenya, they understand that the government must be close partners from the beginning. Even at the caregiver behavioural mapping stage (prior to dissemination of resources) the KKL team reached out to the Kenya Institute of Curriculum Development (KICD), seeking to inform them of their activities, gather advice, and build on the institute's own caregiver engagement resources. As experimentation data trickles in, the KICD will be brought in at every step of the way to ensure that activities are complementary to their efforts.

BRAC: A key part of setting the foundations for this Sandbox was getting positive signals of buy-in from the government. This was partly because BRAC's long-term growth strategy was for government adoption, and partly because the telephone helpline was designed as a supplement to TV, radio, and pen-and-paper distance learning interventions initiated by the government as part of its Covid-19 school closure response. The team was assigned a focal point from the Ministry of Education prior to any actual testing of the helpline and got input from them in the design phase. One severe limitation was the conflicting priorities of government stakeholders during the pandemic response, which limited significant government input.

As we look forward to our future Sandbox engagements, the first of which will be the development of a teacher professional development program with the Sierra Leone Teaching Service Commission (TSC), we have learned to apply this lesson in reverse. Just as early government engagement is crucial for non-state education providers, early outreach with local NGOs and education providers has been an important first step to ensure that government policy and provision can build lessons from local innovators. Ahead of designing our model, we conducted a scoping phase (⬆McBurnie & Plaut, 2021) of interviews with a wide range of local stakeholders, learning from other TPD implementers, and getting feedback on our ideas from outside the government.

Ideas seeded in an emergency response can be pivoted to long-term integration with the existing system

As noted in the Insights from our Global Call for Ideas (⬆Plaut et al., 2020), EdTech interventions too often work in parallel to education systems instead of building on public provision.

Initially, many of our Sandboxes began their interventions to fill in gaps in education provision during Covid-19.

For example, the **Keep Kenya Learning** Sandbox saw that schools needed to close, so wondered about how to reach parents to help keep their children learning at home. The **Mango Tree, Deaf Reach** and **Jusoor** Sandboxes transferred instruction to other means (radio, laptops, and WhatsApp, respectively). The **BRAC** Sandbox developed a helpline to inject teacher presence into a child's use of radio, TV, and worksheets at home.

However, all of the EdTech interventions tested in the Sandbox either pivoted (in the case of the **BRAC** and **Jusoor** Sandboxes) or are preparing to pivot (in the case of the **Mango Tree**, **Deaf Reach, and KKL** Sandboxes) from out-of-school only to flexible in a world where children would sometimes be in school and sometimes out of school.

> **"COVID was a huge challenge, but also an opportunity for EdTech. If we can prove it works, hopefully, government interest and investment will increase"**
>
> **– Maira Siddiqui from Deaf Reach**

Evidence from our Sandboxes:

BRAC: In Afghanistan, a telephone helpline was introduced to supplement the learners' day as they returned to school. It targeted girls who attended government schools and BRAC's community-based schools. One adaptation was that teachers focused less on psycho-social support and motivating the child to engage with learning at home, and more on answering questions or encouraging the child to reflect on what they had learnt in school.

One of the biggest challenges with integration was that the teachers who provided support via the helpline were now doing so 'part time', in addition to teaching duties. Teachers were paid USD 95 per month for being part of the helpline, and many told us that this made them much more likely to be involved. However, the number of calls per teacher per day dropped from 35–40 (when schools were closed) to just over three when schools reopened.

Despite teachers' willingness to be part of the helpline, combining this with teaching made it much more difficult. Teachers often missed calls because they were teaching, or travelling to or from school. This demonstrates the difficulty of pivoting the helpline to supplement (rather than substitute) existing education systems.

KKL: As schools begin to re-open in Kenya, the **KKL** team is thinking about how their campaign might serve to engage caregivers in the long-term,

helping them to build sustainable habits around their engagement in children's learning at home. Once this foundation is set (and habits are effectively formed) the team may look at disseminating content that will supplement school instruction or provide remedial support to learners falling behind.

Mango Tree: Though the listening centre provided by Mango Tree will no longer be the *only* source of instructional content available when schools reopen in Uganda, it has an opportunity to supplement the education system. Given its proven effectiveness as a Saturday broadcast, accompanied by co-teachers who do not require extensive teaching qualifications, the model could be easily adapted to serve as a model for remedial learning.

Place

Where is the intervention being delivered? What physical places will people interact with to access this service?

Adapt your intervention based on the resources and infrastructure that exist from place to place

All of our Sandboxes faced the challenge of implementing an EdTech initiative in multiple locations and the variation of infrastructure from place to place. This includes elements such as systems wealth (for example, the quality of internet connectivity learners have access to, access to reliable energy), and personal wealth (for example, a learner's access to devices, digital literacy, educational capital within the household).

The impact of these challenges is felt by learners if EdTech interventions aren't built for the context of their learners, or contain alternatives in contexts where low wealth is often an issue. This is particularly true with regards to the fact that the more technology we introduce to a place, the more factors such as digital literacy, connectivity, and access to energy there are to consider.

All of our Sandboxes are built on — and are limited by — the personal and systems wealth available in the place. For example, in both the 'simulation' and initial rollout of the helpline, **BRAC** teachers reported that lack of GSM signal, as well as lack of access to a phone, were two of the most significant barriers to calls taking place. For **Mango Tree**, one of the biggest barriers to scaling beyond the district in which the Sandbox took place is that the radio signal for QFM, the station airing the educational broadcast, is less reliable outside of the district. In Pakistan, 30% of **Deaf Reach** students faced difficulty in charging the devices. In addition, smartphones for bi-weekly teacher

check-ins could only be given to students with access to reasonable quality internet connectivity (for video calls).

The needs of EdTech interventions in Sandboxes in places of similar wealth will resemble each other. These three Sandboxes (BRAC, Mango Tree, and Deaf Reach) all relied on low-tech, such as feature phones and radio, or distribution of tech such as offline laptops.

Evidence from our Sandboxes:

KKL: The KKL team understood that caregivers will differ significantly in their ability to engage with technology, and therefore that the campaign's ability to reach them with learning content should adapt accordingly. From the beginning, the team designed with three distinct personas in mind: low-income rural caregivers, low-income urban caregivers, and middle-income urban caregivers. These personas have differing access to personal and systems wealth.

Behaviour mapping conducted on caregivers in these different communities highlighted both the tech accessibility and the differing education needs for each of these personas. As a result, the team is currently designing a number of persona-specific outputs, SMS messages personalised to different day-to-day routines, and 'role model' videos which account for cultural variation and can be disseminated both online, through TV, and in community meetings. This will ensure that caregivers can be reached regardless of their tech accessibility. Ultimately, these will be disseminated with community-based partners that cater to these different communities and evaluated on their ability to adequately improve caregiver engagement in education.

Jusoor: Testing the use of Whatsapp in the Jusoor Sandbox was only possible due to relatively high smartphone ownership (68% of households, according to the community survey). However, over the course of the Sandbox, we realised barriers still existed to a child using this smartphone. These included a child's ability to use the family's smartphone, which was often owned by the father and shared among siblings. It also included access to data, which costs around USD 25 per month per household to fully engage with the Whatsapp learning programme.

Deaf Reach: When it comes to scaling, our Sandboxes recognise the need to both build in time to understand new contexts and design for difference in digital infrastructure from location to location. One of the hypotheses for growth tested by Deaf Reach in the Sandbox was whether they could open-source their videos and work with other grassroots organisations to adopt them for deaf learners in different countries. In contexts where

learners have access to laptops and internet connectivity (in or out of school), this creates a freely available and accessible resource.

They tested this by working with Atfaluna, a Palestinian NGO working in Gaza city, who wanted to adapt videos for use in their deaf school. Much of the context was different; for instance, Atfaluna could not provide their learners with laptops for individual learning. However, the time and effort it took to meaningfully adapt these videos and implement them in this next context did 'work'. Children who watched and discussed the videos performed 20% better on an assessment than children who were taught the same content by a teacher using traditional methods.

Physical environments will have an impact on learning, so it's important to design for them

The need to pivot away from classroom learning (as all of our Sandboxes had to do) took away the consistency of a physical learning environment on which learners originally depended. Home environments can be varied, so it's important to think about how EdTech interventions support learning in a variety of contexts and how the transition from online to offline learning can work best. Elements of place that are important include:

- How big is the space? Do learners have a dedicated space for studying?

- Are there additional distractions (family members, pets, sounds) that can take learners away from their work?

- Are learners comfortable? Do they feel safe? Are conditions (such as lighting and temperature) suitable for study?

- Are there family members present who can support learners to engage with their coursework?

- What is the learner relationship with digital spaces — do they know how to use digital platforms? If not, why not?

In order to be effective, EdTech interventions focused on remote learning may want to include tips for caregivers on how they might create a positive learning environment by, for example, creating a learning corner with a consistent study set-up, managing distractions while learning is happening, and encouraging children to learn together where possible.

Evidence from our Sandboxes:

Jusoor: Jusoor designed tailored information to send to parents, giving them tips on practical things they could do to help children learn at home,

such as how to give children a space to work and concentrate in. This isn't always very easy in refugee accommodation, where a family might be sharing very limited space. While this campaign did not translate into a significant increase in engagement with lessons, 67% of parents found the advice helpful and said they adjusted behaviour as a result.

Mango Tree: As part of the guidebook for co-teachers, they were given support on how to set up a listening centre. For example, it asked co-teachers to ensure that children had chairs, a bench, or mats to sit on for the lesson. It also provided recommendations on how best to allocate and use learning materials during radio sessions and how to position learners so they could best engage with each lesson. Lastly, the guidebook also gave guidance on face mask use and adequate spacing to minimise the risk of Covid-19 spread.

Figure 5. *A listening centre in action. From our Sandbox with Mango Tree Literacy Lab in Uganda.*

Provision

How are initiatives funded? To what extent are their business models sustainable? What would they need to get it to scale?

What combination of funding models would enable sustainable interventions to reach the most marginalised?

When experimenting with Sandboxes, sometimes your key insight is not a profound statement but a new question to explore. In this case, our Sandboxes led us to wonder about the optimal funding model for sustainably reaching marginalised learners. While donor funding is crucial for education in

emergencies for the most marginalised, alternative models for financing education are required for long-term impact at scale.

> **"Refugee families can't afford food. So we can't ask them to pay for access to education"**
>
> **– Suha Tutunji from Jusoor**

All five of our Sandboxes were reliant on donors as their primary source of funding. This is partly because of the emergency context of Covid-19 school closures, and partly because all Sandboxes targeted low-income households and communities. However, all Sandboxes also understood that donor funding alone was insufficient to address the long-term global learning crisis. In some cases, other engines for growth were considered, including scale through open-sourcing of resources, franchising, and support from the government.

Evidence from our Sandboxes:

Deaf Reach: The Deaf Reach Sandbox trialled open-sourcing their videos for other organisations to use. To test the feasibility of this, they partnered with Atfaluna in Palestine and successfully provided funding and consulting support for Atfaluna to translate Deaf Reach's videos to the Palestinian context. In a test, children who watched the videos and discussed them as a group performed 20% better on an assessment compared to children who learnt the same content via traditional methods. Although this model was proven to be feasible as a means of increasing the reach of its content, it requires funding from either Deaf Reach and / or the organisation they partner with.

Mango Tree: In future iterations of its radio programme, Mango Tree may test a 'growth through partnership' model, collaborating with primary schools by franchising the model and materials for radio listening centres. In this model, schools would get access to new materials, and a new approach to supplement existing work for a small cost to interested learners.

BRAC: In Afghanistan, the BRAC Sandbox targeted government adoption of its helpline as a potential model for growth, engaging with the Afghanistan Ministry of Education in hopes of being supported by their distance learning budget. To test government buy-in to the concept at the beginning of the Sandbox, the team asked the Minister of Education Rangina Hamidi for a focal point from her department. When we were assigned a focal point, we took this as a *tangible* positive signal. However, as evidence of the telephone

> helpline's success remains mixed, we remain cautious about the scale potential.

While these alternative models for scale may lead to promising engagements for our Sandbox partners, the broader tension between equity and sustainability in EdTech remains.

As we continue to use the Sandbox methodology to support innovators to reach learners in low-income contexts, we hope to experiment with alternative funding modalities to make sure that the most promising ideas are able to scale their impact.

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