Driving Literacy and Digital Literacy -
LESSONS FROM IMLANGO IN KENYA

Extract and summary

This paper discusses the challenges and findings in delivering a large-scale literacy initiative enabled by online digital tools in Kenyan primary schools in marginalised settings. This whole-school initiative was part of the award-winning iMlango programme which in turn was part of the Girls' Education Challenge.

We consider the body of evidence from our programme in exploring the linkage between literacy and digital literacy and the importance these have in helping prepare children for a digital future, and we make the case for new thinking around the online digital white space to help drive forward improved literacy outcomes. In the paper, we discuss our findings of what works at the school, teacher, pupil and parent level, and make recommendations on moving forward with online literacy and digital literacy programmes in marginalised settings.

We find strong indications that online platforms, when well-supported at school and teacher level, make positive impact on the literacy outcomes for children. We make the case that traditional evaluation mechanisms can be set aside when looking for evidence and justification for these tools, and we recommend that a policy of resolute forward progress be adopted, with a focus now on how best to build on the positive steps that online digital education tools enable. We demonstrate the willingness of teachers to adopt new in-classroom pedagogical practises that yield improved literacy results in the context of the school curriculum, and we recommend a shift towards using digital tools (including smartphones) to drive teacher capacity building.

Authors
Lead author: Rabasa Onyango
Co-author: Adam Smith

Note from the authors

Rabasa Onyango

I had the honour of leading the literacy initiative in iMlango over many years, developing at first hand a deeper understanding of the way that digital tools can be used to drive improved literacy outcomes. I worked with a team of project managers whose sincerity and eagerness to help progress children's education was unquestionable, and without their support, and their taking on the ideas we developed for leveraging our tools particularly in whole-class literacy environments, we could not have had success. In writing this paper, I wanted to bring to life an exciting seven-year journey of working with children, supporting teachers in the classroom, interacting with amazing digital tools and content and working alongside some committed and enthusiastic government education officials.

I am grateful to my co-author Adam Smith for encouraging me in my thoughts and helping me to express them with a wider international audience in mind. The result is a white paper which I hope will assist the policy makers and help inform non-government education practitioners, whilst retaining its main purpose of providing a simple and conversational approach to help school-level practitioners - the teacher who wants to improve their literacy pedagogical skills using technology, the head teacher or school board member who is interested in whole school literacy improvement, and even the parent who wants to support their children in developing literacy skills. If these findings can also help a new digital literacy project in a new setting be more successful, then I feel we have done our job.

I can summarize my experience in the following words said by Goethe: "Whatever you can do or dream you can do, begin it. Boldness has genius, power, and magic in it." I dedicate this paper to Teacher Sarah of Sultan Hamud Primary school in Makueni county whom I found fearing to touch the computer mouse to access English sounds and who now supports and mentors other teachers to teach using digital tools.

Rabasa holds a Bachelor of Education from the University of Nairobi, a Master of Education from Masinde Muliro University of Science and Technology, and is a current PhD candidate in Education Communication Technology and Curriculum Studies at Maseno University.

Adam Smith

My work in the humanitarian sector brought me into Kenyan schools in 2013, and I was struck then by the enormous potential that a digital education platform could offer in marginalised settings. As a founding member of iMlango, our seven-year journey has been tremendously rewarding, and we have had to overcome many challenges. I have always felt that iMlango created something truly impactful and with the potential for lasting improvement, and that we should try to write down our own learnings in a style that might serve useful for others. I am grateful to Rabasa for his insights and for authoring this white paper, and for allowing me to contribute to its structure and the findings.

Adam is the Founder and Chief Executive of sQuid, a specialist in digital platforms for the education sector. He was the co-founder of the iMlango programme.

Acknowledgement

Through the duration of this programme, as well as having the support of the Girls' Education Challenge, we are grateful for the support and successful co-working of our partner organisations including Avanti Communications, Whizz Education, Camara Education, the schools, teachers, local communities, and above all the Ministry of Education.

Summary of this document

About iMlango
iMlango set out to improve learning outcomes in literacy and numeracy with a whole-school online digital programme leveraging infrastructure, education services and content. Working with more than 200 schools, supporting over 180,000 children at any one-time, digital resources included broadband internet, in-school computer devices (labs and whole class teaching) and the iMlango digital learning platform comprising attendance monitoring, digital content in literacy, an algorithmic maths learning tool, and other subject specific content. iMlango was fully supported with a talented field team and worked closely with the Ministry of Education in the four counties of Kilifi, Kajiado, Makueni and Uasin Gishu, where it operated in mainly rural, and always marginalised settings.

Our first observations
We found that in most cases, schools and their communities had a genuine desire to embrace digital services. Sometimes, head teachers were less enthusiastic, and we observed that this was often due to their own lack of digital skills.
The task of helping teachers to understand and work through how to use the tools was to become one of the most significant iMlango challenges. Nevertheless, always we found children ready and willing, enthusiastic, and wanting to learn.
Our literacy strategy was initially based on selecting a range of content including syllabus and non-syllabus books, revision guides and digital versions of existing approved programmes. Though correct, we would need to build more hands-on support to scale the 'Teacher barrier'.

Adapting iMlango's literacy strategy – working with teachers
Clearly, the programme was intensive in terms of teacher-focused support, but we realised that without it, iMlango ran the risk that literacy improvement might not be achieved, with the digital assets going unused. In other words, we might be consigning children to a further disadvantage – knowing that digital assets were in sight but prevented from learning about and using them.
Building good outcome-oriented action plans for teachers to use digital tools is an essential for success. This took time and required a build-up of trust between teachers and our field team members.
Later in 2020, when we faced the Covid challenge of pivoting the programme in some way toward children at home when the schools closed, our strong relationships with many teachers helped to develop school/community linkages through phone-based forums, and home-schooling initiatives focused on continuing to drive literacy engagement and improve progress.

Working with school community representatives
iMlango approached the learning challenge as a whole-community opportunity. We had no embedded traditional learning prejudices, and we were conscious of wanting to ensure an 'after donor' legacy, so we set out to bring the communities closer to the school gate. Our field teams sought active community engagement and worked with the school community representatives to enhance closer linkages and collaboration. Our approach included meetings between the head teachers, boards of management and parents' representatives, helping to cascade understanding to the parents and to encourage their participation in initiatives around homework and especially reading at home. This was extended further when we introduced the iMlango at-home mobile app. Though not universally successful, we generally gained positive community response. This should be seen in the context of parents who themselves have limited education and perhaps poor personal education experience.

iMlango and the Girls' Education Challenge
As a GEC sponsored programme, our emphasis was very much on understanding how to deliver lasting positive change for girls. Our approach was whole school in implementing the digital tools and gaining engagement from teachers, and always with a focus on girls. This same approach was used in addressing the literacy and digital literacy components of the iMlango initiative. We ensured strong emphasis throughout on the girls by encouraging equality in the classroom from our literacy teachers, equal access to all digital tools, and emphasis on child clubs for girls. In developing this white paper, we have concentrated more on the whole school and whole community challenges of successful implementation of digital education tools than on the relative impact on girls vs boys, but for each of our findings, it should be stressed that an emphasis on girls should be ever-present, seeking to ensure conscious orientation to the needs of the girl child, and avoiding defaults that might favour boys above girls. You can find out more about iMlango in the context of the Girls' Education Challenge at https://www.imlango.com/ and on the GEC website here: https://girlseducationchallenge.org/projects/project/imlango/

Our Key Findings

Key finding 1 – teachers' own digital devices are creating an accessible network and have the potential to become a tool for teaching improvement activities. 60% of teachers surveyed by sQuid reported that they received programme support via WhatsApp.

Key finding 2 – teachers can make the shift to using online resources in whole class literacy settings. 88% of teachers surveyed rated the content and resources on the iMlango Learning Platform as 'Very helpful'. A progressive approach is needed with a variety of resources available and supported by continual tracking and encouragement of teachers to embrace the new tools and the unfamiliar.

Key finding 3 – in marginalised school environments, the process of teachers engaging with digital tools can be slow. Progress can be achieved with a focus on small steps, enabling teachers to engage at an appropriate pace. Capacity-building might best be tailored to the different task levels, avoiding a one size fits all approach. Teachers may benefit from a more accessible micro-steps capacity building tool tailored to this approach.

Key finding 4 – Parents will engage in literacy learning for their children in marginalised settings. There is enough evidence from our preliminary work to suggest schools should be encouraged and supported to create this important bridge to at-home learning. The digital network of smartphones is growing (our data indicated that c.40% of households in iMlango's marginalised communities had access to a smart phone), and that asset will continue to grow. New innovative approaches are needed to take advantage of this in a literacy learning context, whilst continuing to support non-digital initiatives for those who do not have access.

Key finding 5 – iMlango established a pilot pathway for at-home literacy learning using a digital tool, in marginalised environments. The issues are now clearer, and the opportunity is significant. A white space is fast emerging, created by parental smartphone access, and we advocate building on our early findings to create initiatives that will create a real contribution to the literacy outcomes of children in these settings.

Key finding 6 – iMlango can point to clear positive trends in literacy improvement through its data, supported by qualitative observations, such as a 20% improvement in oral passage reading ability when compared to the baseline rate. These data trends alone do not make the case for digital platforms but add to the body of evidence from the programme that a collective positive momentum towards literacy and digital literacy improvement has begun.

Key finding 7 – We identified 5 key but surmountable barriers to making significant literacy and digital literacy progress in schools and recommend that these be carefully considered in designing future programmes. The barriers are;

- Lack of a whole school system including the local community
- Disconnect between curriculum demands and the need for 21st century teaching and learning skills
- Quality and range of teacher pre-service training
- Limited ability of teachers to use data to assist teaching strategies in large classes
- Disconnect between education theory, policy, and practice

Our lessons and recommendations

Lessons learned 1 – Embrace the digital white space
We advocate decision-makers adopt a new mind-set in the digital education white space, seeking to embrace positive steps and constantly looking to improve through being open to digital innovation. We encourage policy makers to partner with digital players, and together seek rapid outcome led change in enabling children to flourish in literacy and digital literacy.

Lessons learned 2 – Allow good content to emerge in new digital formats. Ensure alignment of content with curriculum, but also allow teachers and students to explore and experience new ideas that may become transformative.

Lessons learned 3 – Access
Adopting digital formats needs flexibility within the school timetable and allow for set-up time in lesson planning. Where computer labs are available, ensure schools maximise the opportunity of students to learn, through school clubs, etc.
Encourage use of ever-growing smartphone networks to enhance the teaching and learning experience.

Lessons learned 4 – Teacher-centric thinking
Actively manage capacity building amongst teachers in use of digital tools, with comprehensive pre-service and in-service modules. Implement them in digital formats, leveraging e.g., smartphones, to normalise digital thinking in the teaching environment. Support this with school-level mentoring and review, and encourage teachers to participate in advancement of learning tools – what works, what does not work, etc.

Lessons learned 5 – Adopt data at the class level
Online digital platforms provide a wealth of data for a teacher and a school. Distributing information to help teachers focus on learner groups for literacy and other subjects can rapidly improve literacy learning amongst learners.

Lessons learned 6 – Children will embrace digital tools
We strongly advocate policy to provide opportunity in marginalised settings to further help children build their digital literacy through in-school and out-of-school digital tools. We should do everything possible to encourage their participation.

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Abbreviations

BoM	Boards of Management
EGRA	Early Grade Reading Assessment
ICT	Information Communication Technology
KNEC	Kenya National Examinations Council
MoE	Ministry of Education
PA	Parents' Association
UK FCDO	UK Foreign, Commonwealth & Development Office
TPD	Teacher Professional Development

Chapter 1: Introduction to the challenges

Literacy

Despite the achievements in education equity and access in sub–Saharan African countries, research consistently indicates that children in early grades of schooling do not have the requisite skills in literacy (and other subjects). These gaps are carried over to later grades and persist up to high school. In Kenya, standardized tests showed that fewer than 10% of primary school age children who had reached grade two were reading at the national grade level benchmark in English (Laser Pulse, 2019). According to the Rwanda Bureau for Economic Growth, Agriculture, and Trade (EGAT/ED), United States Agency for International Development (USAID); and USAID/Rwanda, 98% of grade six pupils could not respond to more than half of the comprehension questions with 62% unable to respond to even a single question correctly. No students demonstrated comprehension of at least 80%.

Improving learning outcomes in literacy and integrating technology in classroom pedagogical processes are part of the 21st century educational aspirations of sub-Saharan African countries. Education policies and strategic plans as articulated in education blueprints in these countries (the United Republic of Tanzania (2018) and The Federal Democratic Republic of Ethiopia (2016) recognise the advantages that come with learner literacy competence and the use of technology in teaching and learning (Gove, A. et al, 2011)). Further, according to Solmaz, D.Y (2017), literacy is acknowledged as the single indicator of quality education being offered in schools and the single enabler of learner academic and life improvement.

Literacy is an essential to enable acquisition of computer literacy skills and competencies, and these together are surely the bedrock for tomorrow's successful African economies. The addressing of literacy in the context of 'digital' readiness is yet to become mainstream in the dialogue of educators. This paper seeks to discuss and help address the urgency of this.

Rapid change in digital landscape

The rapid global advance of the smartphone is now fully evidenced across sub Saharan Africa. As data access becomes more affordable, it opens up the opportunities of the digital economy within the digital ecosystem. The pace of change is astonishing, with even the poorest of communities embracing these devices. But the digital divide between those able to exploit digital opportunities and those unable to risks widening – if literacy skills continue to develop slowly, we risk inhibiting the potential of the youth of Africa relative to the youth in other countries for years to come. The next ten years will see even more rapid change and opportunity arising in the digital environment, and this urgent problem must be addressed - if the skills of teachers in using digital tools and teaching literacy cannot improve fast enough to provide improvement for the learners in these areas, then countries will fall further and further behind in equipping children with literacy and in turn further restrain their ability to access and contribute to the digital economy as anything more than (semi-literate) consumers. The economic models that predict the growth of the sub-Saharan African countries may therefore be unrealisable, if something is not done to accelerate literacy progression at the school-teacher-student interface.

Policies for integrating ICT and educational policies

Western and developed countries have been implementing Information Communication Technology (ICT) in education for some time. They have introduced ICT in their education systems long before the developing countries, and have built infrastructures, trained teachers, provided internet accessibility for schools and encouraged collaboration among the teachers of the nation to embed ICT and have it support teaching and learning. As a result, they are already integrated and generally getting positive feedback on their ICT approach to education. Simply put, it has become 'the way we do things around here'.

Kenya, like many other African countries, is some way behind. Policies exist but challenges exist in clarity of implementation, know-how and funding. Trials abound, and some progress has been made. The country has a plethora of digital initiatives in education, some large scale, most small, some are Ministry level programmes, and some are independent, often funded through direct intervention by aid and development organisations. All are well-meaning, some are more impactful than others, but there is a shortage of actionable, data-rich findings to assist decision-makers in ICT matters for schools and encourage the kind of scale implementation that is, ultimately, needed.

A recent significant step forward has been the introduction of computer devices into Kenya's primary schools. Almost all have a supply of tablet devices, yet many remain in boxes and unused. Variable implementation at school level, gaps in teaching strategies to leverage the devices, and the lack of online capability all risk diminution of the impact of this considerable investment. The recent changes to curriculum should address this in part, but gaps remain in leveraging this digital asset in implementation, policy on connectivity, content delivery and student digital-readiness planning.

Burning platform

With the established global pace of education reforms toward ICT integration in teaching and learning, Kenya and other sub-Saharan countries risk falling further behind, particularly with regard to literacy - even as they are making some progress, the relative gap continues to grow.

Addressing the challenge is complex. It must include literacy teaching skills alongside improving ICT availability, with harmony between the two. Creating the digitally savvy teacher, enabling them to benefit from improved teaching resources and to better develop their competencies, seems an obvious and vital priority if the digitally supported (even driven?) classroom is to be a reality, and if such a reality is in turn to drive better learning outcomes for children. There must be content supporting the curriculum and there must be a concerted effort to improve digital literacy, in order to help a student confidently navigate and use digital learning tools.

Relevance of this paper

Since 2014, our digital development programme, iMlango, has been steadily building a library of understanding and experience in addressing a variety of issues in the context of marginalised education settings in Kenya. We have focused especially on the challenges of delivering a workable digital learning strategy with particular emphasis on improving literacy outcomes for primary school children. Sponsored by both the UK FCDO within their Girls' Education Challenge and by individual contributions from member organisations co-operating under the iMlango nameplate, we have built a deep understanding over seven years of the contextual realities and how progress can continue to be made.

In this paper we discuss our findings from iMlango as to what works using online digital tools to improve literacy and digital skills. This discussion is not intended to be an evaluation in the traditional sense of 'M&E' but to encourage the reader to look at our findings in the context not of 'how do we drive forward to deliver an effective digitally ready cohort of young people' rather than 'do digital tools drive better learning outcomes'.

Chapter 2: Gathering evidence as to what works in establishing literacy and digital skills

About iMlango

iMlango set out to improve learning outcomes in literacy and numeracy with a whole-school online digital programme leveraging infrastructure, education services and content. Working with more than 200 schools, supporting over 180,000 children at any one-time, digital resources included broadband internet, in-school computer devices (labs and whole class teaching) and the iMlango digital learning platform comprising attendance monitoring, digital content in literacy, an algorithmic maths learning tool, and other subject specific content. iMlango was fully supported with a talented field team and worked closely with the Ministry of Education in the four counties of Kilifi, Kajiado, Makueni and Uasin Gishu, where it operated in mainly rural, and always marginalised settings.

Landscape for iMlango

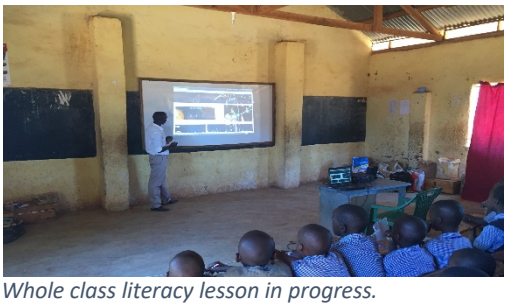
Across more than 200 rural and marginalised primary school settings, we found the local landscape typified by.

- *an existing level of awareness (but not experience) of the use of technology in schools through the government digital literacy program;*
- *a base of school-based Teacher Professional Development (TPD) and appraisal policy on integration of technology in teaching and learning, but with limited teacher skill levels;*
- *some ICT teachers with ability (and willingness) to support implementation of new tools;*
- *some schools had 'star' literacy teachers – many already trained by the TUSOME national literacy program;*
- *learners almost always enthusiastic and ready to embrace technology in their school;*
- *communities almost universally welcoming ICT tools in their schools, with parents recognising and broadly supporting the need for their children to have access to such 21st century tools;*
- *school Boards of Management and Parents' Associations generally open to actively supporting the adoption of new tools and resources in their school;.*
- *in-school leadership often limited, e.g. head teachers reluctant to offer teacher support and mentorship. This situation was made worse if local government mechanisms for teacher support, mentorship and reward were weak*
- *limited school-to-community promotion of literacy learning at home.*

Early challenges

After the initial deployment and euphoria associated with establishing the physical equipment to deliver the digital network in schools (though not discussed in this paper, the logistics challenges and learning on successful deployment are noteworthy), we began to experience the deeper challenges of achieving literacy improvement and digital engagement. It rapidly became clear that availability of the digital tools alone would not be enough. Schools generally lacked the capacity to take advantage of them. Issues particularly revolved around teacher capacity and included:

- '*techno-reluctance'* – difficulty in getting to grips with the digital tools, often with inability to set up ICT equipment provided for whole-class lesson delivery. When combined with weak external teacher support in-class, and poor at-school mentorship for teachers, this meant that digital tools were not being accessed.
- lack of skills and confidence to access, navigate and identify relevant literacy content suitable to the learner's level.
- lack of pedagogical knowledge to prepare and deliver learner-centred literacy lessons incorporating all the components of reading.



Whole class literacy lesson in progress.

- lack of skills to test learners using the Early Grade Reading Assessment (EGRA) and limited knowledge of how to use the data to categorize learners into competence categories for individualized teaching.
- Weak teacher classroom peer support and mentorship – with absent or limited-in-function English subject panels at the schools.
- Large classes inhibiting individualized teaching and learning approaches that are best suited to the learner reader competence categories.

Our first observations
We found that in most cases, schools and their communities had a genuine desire to embrace digital services. Sometimes, head teachers were less enthusiastic, and we observed that this was often due to their own lack of digital skills.

The task of helping teachers to understand and work through how to use the tools was to become one of the most significant iMlango challenges. Nevertheless, always we found children ready and willing, enthusiastic and wanting to learn

Our literacy strategy was initially based on selecting a range of content including syllabus and non-syllabus books, revision guides and digital versions of existing approved programmes. Though correct, we would need to build more hands-on support to scale the 'Teacher barrier'.

IMlango literacy focus – teacher centric strategies

It was clear that teachers needed significant support in embracing digital tools, so we devised a capacity building programme to include:


Teacher Capacity building session in progress

- Helping teachers prepare literacy lesson plans and understand model literacy lesson presentations;
- Adapting digital content to help teachers with literacy lesson structure;
- Guiding teachers to confidently navigate the digital assets, identifying relevant content according to each grade level;
- Mentoring teachers in the importance of regular assessment in literacy level and progress. This meant assessing learners reading competence using EGRA, categorizing them into reader categories and offering individualized teaching according to learner capabilities;
- Supporting teachers to form literacy panels for in-school peer support; guiding peer review methods using classroom observation and feedback. Teachers use this tool to show what worked well and the areas that need improvement. They have internal sessions to discuss each other's progress in a collaborative manner.

As well as direct capacity building, we sought to develop the teaching literacy *environment*, by:

- Encouraging schools to create teacher and learner champions to help teachers in setting up ICT equipment;
- Establishing lunch time teacher briefing sessions - to share project progress data and enable a question-and-answer session with the teachers;
- Holding literacy forums for Head Teachers, Parents' Associations (PA) and Boards of Management (BoM) to focus on their roles in promoting literacy. These would later be

important in the home-schooling digital literacy initiative that emerged in response to the Covid crisis;

- Developing a partnership with government curriculum support officers to conduct joint school visits for teacher support and mentorship, using these to further embed the digital literacy focus.

Adapting iMlango's literacy strategy – working with teachers

Clearly, the programme was intensive in terms of teacher focused support, but we realised that without it, iMlango ran the risk that literacy improvement might not be achieved, with the digital assets going unused. In other words, we might be consigning children to a further disadvantage – knowing that digital assets were in sight, but prevented from learning about and using them.

Building good outcome-oriented action plans for teachers to use digital tools is an essential for success. This took time, and required a build-up of trust between teachers and our programme officers.

Later in 2020, when we faced the Covid challenge of pivoting the programme in some way toward children at home when the schools closed our strong relationships with many teachers helped to develop school/community linkages through phone-based forums, and home-schooling initiatives focused on continuing to drive literacy engagement and improve progress.

EGRA at the heart of driving change in literacy

When dealing with very large class sizes, often in the range of 60-90 pupils, we observed that the task of teaching basic literacy can be overwhelming. Teachers often have limited experience in assessing their pupils. Using a reading stimulus incorporating all the components of reading, we encouraged teachers to test learners reading capabilities and to better consider as well as understand the learner reading level. The EGRA tests assess the key components of reading: sound knowledge, familiar word reading, invented word decoding, reading fluency and comprehension. With a digital library available for whole class lessons, ranked to grade and learner category , teachers were able to choose the appropriate books from the learners. In many schools, we also had computer labs, which provided opportunities for individualized learning, and when used well, this further helped teachers determine which learners needed additional support during whole class sessions.

A reading assessment in progress

As well as reader assessment, we also encouraged literacy teachers to establish English subject panels, to foster collaboration in peer teacher support, lesson modelling and sharing of progress records, and of course sharing peer-level feedback.

A feedback session following an in class peer review

While some schools had pre-existing English subject panels, we found many did not, so establishing these became a crucial part of the literacy drive.

When done well, the teacher peer review helps build trust, then understanding and ultimately competence. Mr. Macdonald Nassoro, a teacher from Jilore Primary School says that he valued the feedback given after being supported by his peers during a literacy lesson delivery in standard 4 pupils. "**From the feedback, I was able to know why it is important to categorise the learners according to their reading abilities as it enables me to give reading tasks that match their abilities."**

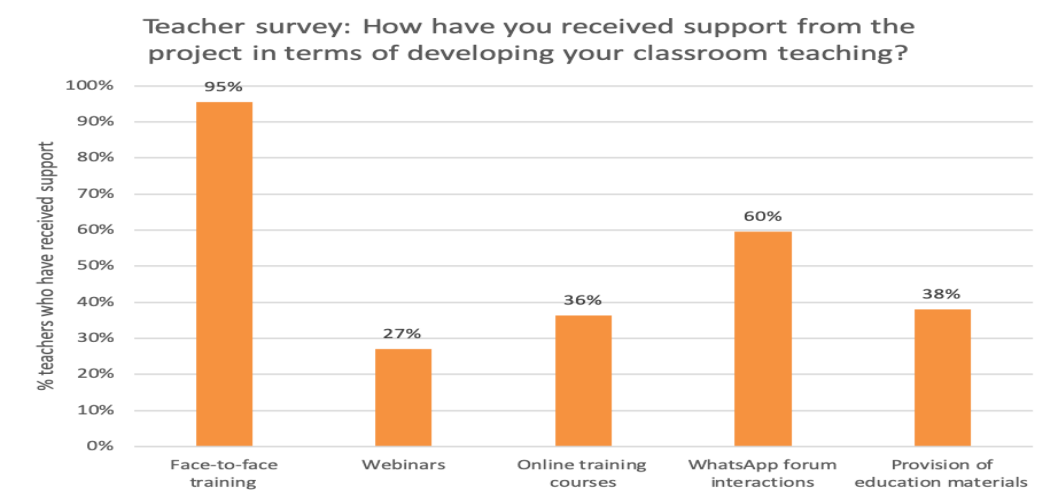
Finally, we encouraged teachers to try to engage parents in the literacy learning process using a home reading tracker to monitor parental involvement in learners' home reading activities. Teachers give learners reading assignments to read to their parents and also for the parents to read back to them. Parents sign to confirm that they have read with the learners (we extended this idea with the at-home learning app which we developed in response to the covid crisis).

Working with school community representatives
iMlango approached the learning challenge as a whole-community opportunity. We had no embedded traditional learning prejudices, and we were conscious of wanting to ensure an 'after donor' legacy, so we set out to bring the communities closer to the school gate. Our field teams sought active community engagement and worked with the school community representatives to enhance closer linkages and collaboration. Our approach included meetings between the head teachers, boards of management and parents' representatives, helping to cascade understanding to the parents and to encourage their participation in initiatives around homework and especially reading at home. This was extended further when we introduced the at-home mobile app. Though not universally successful, we generally gained positive community response. This should be seen in the context of parents who themselves have limited education and perhaps poor personal education experience.

Shifting teacher support to digital communication channels

Figure 1.

Percentages of teachers that received support through various teacher support models.



Over the seven years of the programme, some key positive changes occurred. The smartphone became far more commonplace amongst the teaching staff, and with it, unsurprisingly, we observed greater appetite for digital tools. Figure 1 shows that 60% of teachers reported receiving project support via WhatsApp, underlining not just the high and growing penetration of the smartphone, but the acceptance of the personal device as a teacher support platform.

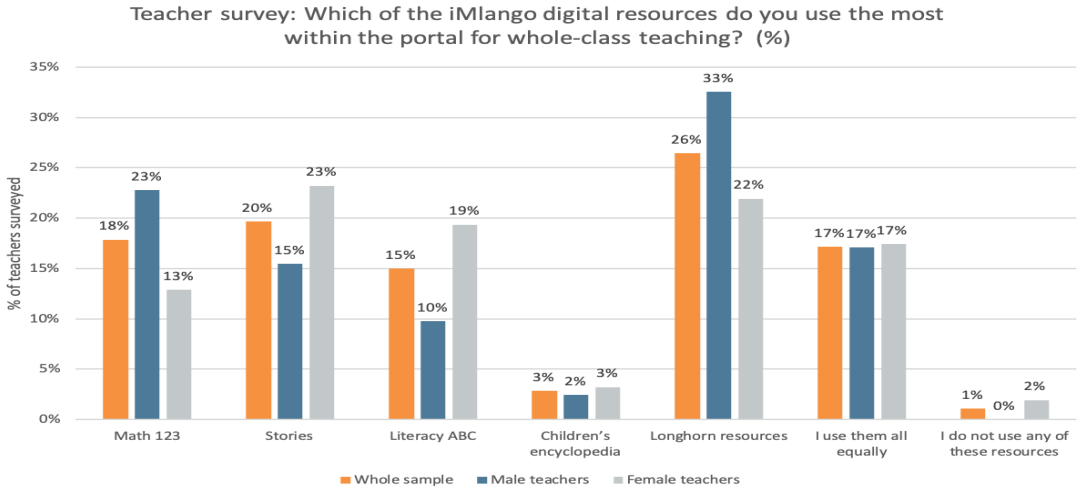
When the Covid pandemic resulted in school closures, the iMlango literacy team used WhatsApp to form groups of teachers and parents, in preparation for providing at-home digital and non-digital learning tools. We established a WhatsApp group in almost every school community.

Key finding 1 – teachers' own digital devices are creating an accessible network and have the potential to become a tool for teaching improvement activities. 60% of teachers surveyed by sQuid reported that they received programme support via WhatsApp.

Using digital resources in whole-class settings

Figure 2.

Online resources used by teachers in the literacy and numeracy intervention.



There are some interesting observations relating to Figure 2[1]. The most used resource was the Longhorn syllabus content. This confirms our qualitative observations where we saw teachers tending to make their initial shift to iMlango's online resources by focusing on the familiar. 15-20% of the teachers indicated they used the stories most (this includes Literacy ABC), with notably more female teachers vs male accessing these resources more frequently. Our literacy improvement efforts featured using stories in whole-class settings to encourage greater learner engagement in reading as well as tagging stories to reader levels, and these teachers often exhibited a significantly different approach and style. In the right circumstances, teachers will change teaching styles and especially if they feel it enables them to make better progress with the learners.

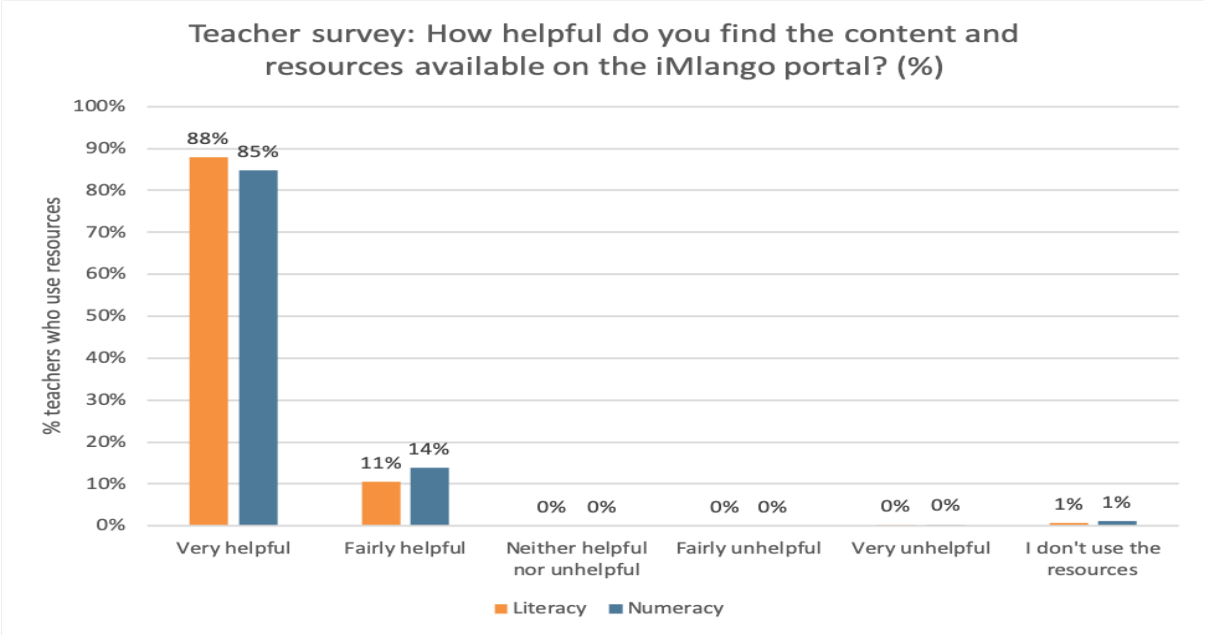
It is worth noting how the online encyclopaedia was used. In our view, a teacher using the encyclopaedia is demonstrating an advanced approach, moving into a teaching scenario where they are showing children how to navigate to a resource and to access a range of material. It also requires a degree of preparation pre-class by the teacher. We felt that the encyclopaedia should be included to help demonstrate what can be possible with online resources, but we recognise that more work is needed to help create 'threads' to assist teachers in how best to use such an 'enquiry-based' resource in a whole class setting. However, we think this opens a new dimension in creating dynamic and stimulating lessons.

Mr Charles Kamama, a science teacher in CRS Primary in Kilifi county said, "I have been using the children encyclopaedia to enrich my science lessons for standard 8, and this has made learning very interesting, and pupils do not want to miss the science lessons".

[1] The usage if the Maths tools was the subject of a parallel initiative within iMlango, focused around an online maths tutor platform. It is not discussed in this paper.

Figure 3.

Teachers' perceptions on how helpful maths and literacy tools were to their teaching experience.



Teachers indicated that they found digital literacy and maths tools very helpful in teaching literacy and numeracy.

> *Note: In the project, we emphasised computer lab time on maths (80% of available time) utilising the Maths Whizz algorithmic tool delivering individualised learning, and we emphasised the available time with ICT tools in whole class settings for teaching literacy (and this was supported with some computer lab sessions where students could directly access reader level online stories and the children's encyclopaedia under the guidance of the teacher).*

Our field observations and monitoring confirm that the first and most natural step towards changing the teaching-learning paradigm is to focus on literacy and with it, digital literacy (an ability to navigate and competently use digital services) in the whole-class setting. This is likely to be most cost-efficient in terms of initial capital investment, reach per child, and to help prepare children for accessing other subjects through digital tools.

If computer labs are available, these are likely to be a limited resource in a marginalised school environment. Although not the subject of this paper, analysis of the iMlango experience delivering improvement in maths (which was a significant part of the iMlango effort, in terms of focus on the Maths Whizz individualised learning tool) showed the importance of having self-actualising teachers to drive the use of the digital maths resources, and a digitally literate teacher is a precursor to them achieving this state. We feel strongly that a whole class digital literacy strategy will better prepare students and teachers to get the best from computer lab resources.

It is important to note the difference between what teachers say (in a survey), and what teachers actually do. We saw throughout the project that some teachers logged into the digital resources only rarely, and others required continuous persuasion by project staff. Log-in data might be understated where teachers use a student to log-in for a whole class projector-delivered session, but we found that continual effort needs to be made to encourage digital resources becoming 'the way we do things around here'. Whilst we believe the trend is generally toward more engagement in provided tools, teachers are also faced with a host of other tasks, and often in difficult school environments. Expectations of success in adoption of digital resources should be realistic, and recognise that building momentum takes time.

Key finding 2 – teachers can make the shift to using online resources in whole class literacy settings. 88% of teachers surveyed rated the content and resources on the iMlango Learning Platform as 'Very helpful'. A progressive approach is needed with a variety of resources available and supported by continual tracking and encouragement of teachers to embrace the new tools and the unfamiliar.

Teachers' perceptions on the impact of the project in teaching and learning.

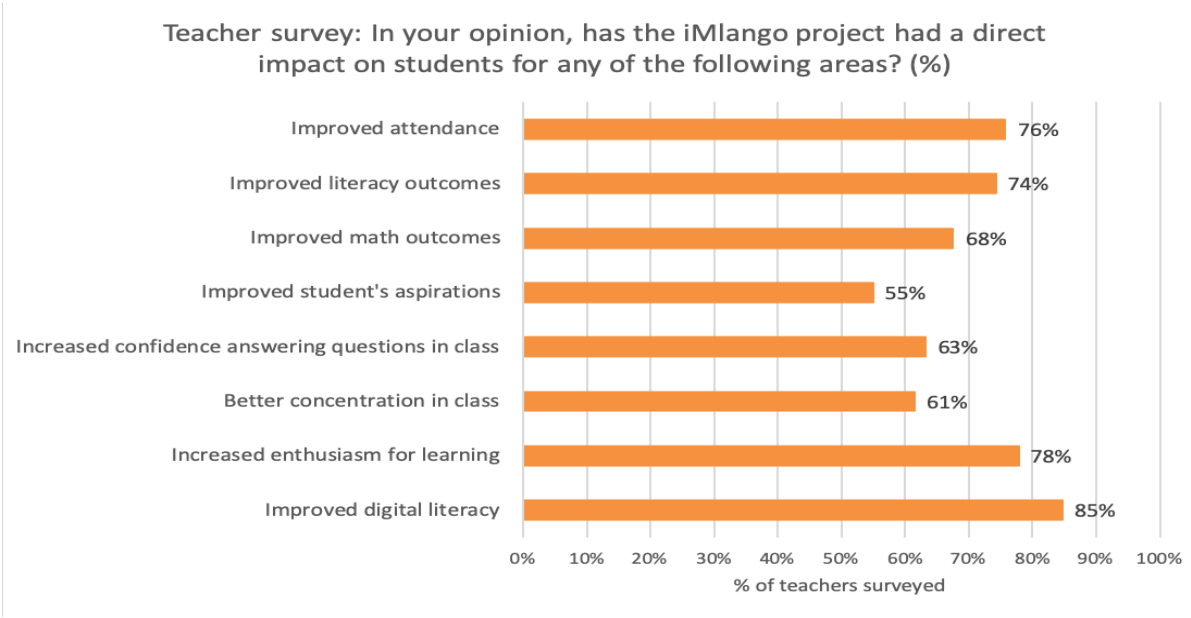
Throughout the programme, we observed genuine enthusiasm for the effort of trying to provide online resources to help improve learning outcomes. Whilst this was not universal - with a few instances where a head teacher simply gave no support and the programme made little progress - in general we saw genuine interest and in many cases real commitment at both a whole school and individual teacher level.

Child Champion supporting a teacher to set up teaching and learning equipment.

In our research we asked teachers what impact the programme had made, and the results were massively positive, and especially in regard to digital literacy improvement.

Figure 4.

Teachers' opinion on the impact of the project to learners in various areas of learning.



How should we interpret this data? We think it supports one of the most significant findings from our programme, that there was a genuine engagement and commitment amongst many teachers. Throughout the project, we heard anecdotally that parents were keen to see their children benefit from the digital learning tools, and teachers observed that children were more eager to be at school. This data suggests teachers overwhelmingly consider that learning engagement and outcomes do improve with access to these resources. Whilst we fully acknowledge that the day to day pressures and other priorities in schools mean that hard results such as improved exam scores are not

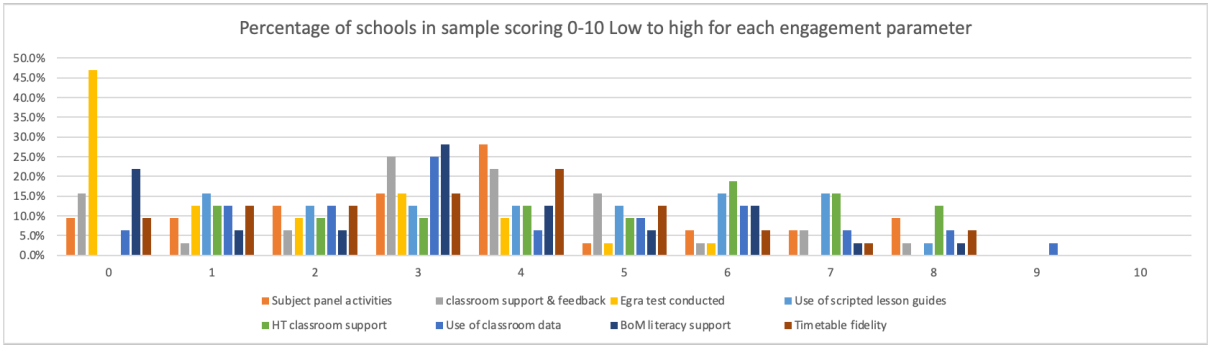
guaranteed, we feel this attitudinal response is pivotal in helping achieve literacy and digital literacy goals.

Measuring school engagement

We balance the positivity expressed by the teachers with our own objective assessment of school engagement. We looked in depth at a group of 32 schools across the four territories to consider the way that these schools engaged in the literacy initiatives. At first sight, when we examine school scores on the 0-10 scale (low to high) we see very few high scores for any particular parameter. The dominance of low scores might tempt a conclusion of small progress as being insignificant progress.

Figure 5.

Assessing school engagement.



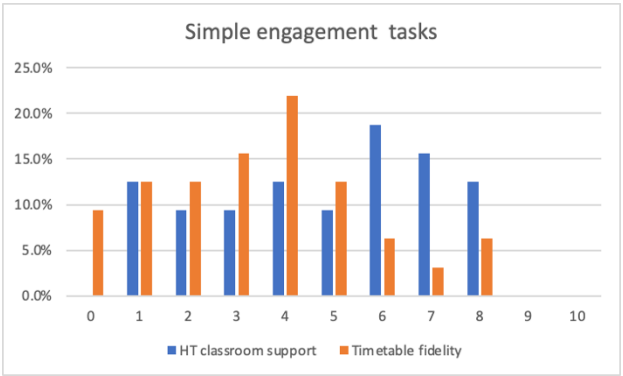
However, in discussing the results with the field teams themselves (who had awarded the scores) we realised that small progress may in fact represent very significant progress – rather like overcoming inertia, the hardest effort is in the creation of the initial movement. We explore this below.

A new way to assess engagement?

If we consider the same data above in a disaggregated format, a pattern of performance begins to emerge as the teachers taken on the simple then the more complex tasks;

Simple tasks

Timetabling – a critical objective was to try to get schools to schedule the use of the digital resources. Generally good progress was observed, but the disruption of schools timetables was a constant issue.

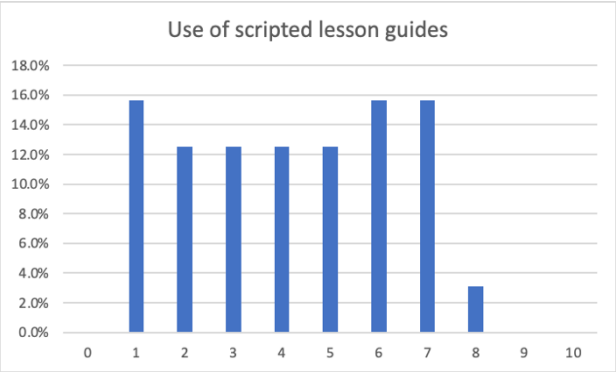


Head teacher classroom support – as a measure of head teacher engagement, we generally had medium to good levels of engagement. Where the head teacher engagement is low, we observed that it was extremely hard to achieve significant progress on any other measures. We also experienced frequent changes of head teacher at the start of a school year, and this created disruption since a new head teacher might not initially be supportive, and so delays in the programme might ensue.

Across the two parameters, we see scores across the range and several schools achieving scores of 6-8.

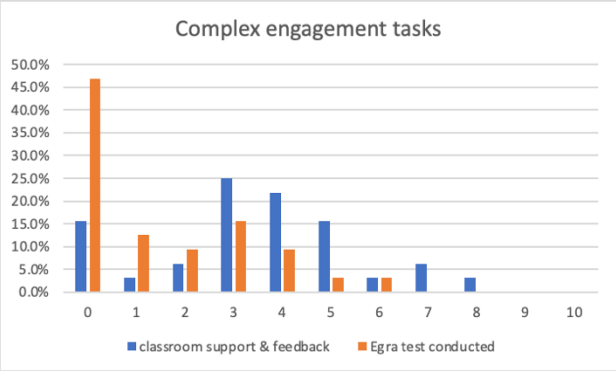
Medium level tasks

Use of scripted lesson guides – we developed a methodology for guiding literacy teaching, and once we built trust and rapport with the teachers, progress in adopting these lesson guides was generally good, with many schools scoring in the 5-9 range.



Complex tasks

Classroom support and feedback – this type of feedback was a new experience for most teachers. Although adopted easily enough, the quality of this task was a little lower – scoring in the 3-5 range. We felt this was an encouraging result, but with much still to do.



In embracing EGRA testing, this represents a very new approach for teachers and 50% of schools had made no progress at the time of survey. Of those that had engaged, their effectiveness levels were generally low, in the 1-4 range, with only a very few schools making progress at 5 or 6. Over time, we would expect to see schools gradually improve.

Key finding 3 – in marginalised school environments, the process of teachers engaging with digital tools can be slow. Progress can be achieved with a focus on small steps, enabling teachers to engage at an appropriate pace. Capacity-building might best be tailored to the different task levels, avoiding a one size fits all approach. Teachers may benefit from a more accessible micro-steps capacity building tool tailored to this approach.

Tackling learning at home

In late March 2020, Kenya responded to the Covid crisis with a number of measures, including the closure of all schools. Much is being written about learning loss and the generally poor provisions that existed across sub-Saharan Africa to support children in a home schooling setting.

In our programme, one of our Covid responses was to push the digital boundary beyond the school gate. With an existing online platform being used in schools, we set about the challenge of how to deliver access to it on a simple smartphone, typically and increasingly used by parents even in marginalised settings (our survey indicated that around 40% of homes in our marginalised communities had access to a smartphone).

iMlango's downloadable home-schooling App was built by our software team and aimed to support learners by providing access to the literacy and numeracy content. Addressing the apparently simple challenge – make an app available, help parents access it, encourage them to give their children at-home access - in fact proved to be complex, as we discuss below.

This was the first time such an initiative had been tried, and we discovered that in fact there is a journey to undertake in introducing at-home digital tools in marginalised settings. To give some sense of initial impact, In the early days of the programme, we provided c.1,000 app downloads, with some

1,600 story books downloaded, with 787 of these read (representing some 2,300 chapters). As the data and uptake grew, we were able to uncover more about the issues that drive uptake[2]. These are;

Precursors – informing and helping parents engage.

1. Establishing a network of parents – most school Boards of Management (BOMs) did not have records of parents' phones, so a large phone-based exercise was required to draw together this network – this was carried out by our field team, being mindful of data protection issues
2. Building a group of sponsors in each school – typically based around the BoM, but extending further into the parental group at each school, this was critical for engaging parents. Parents in this setting generally had not had close engagement with the schools in home learning.
3. Working hand-in-hand with the community sponsors to help get the message out to parents and to help them manage a download.

These precursors can be prepared for more easily in a non-Covid/non-lockdown scenario, using school meetings to build the parental network. With the increasingly widespread use of social media tools that enable groups to be formed, we think this preparation should be more widely adopted, and will help bring parents closer to the education agenda for their children.

Driving take-up - Identifying and overcoming parental barriers

Even with a smartphone penetration estimated at c.40% of households, there are likely to be substantial barriers to take-up of a new digital learning service;

1. Lack of internet data bundles, giving rise to concern over costs of data
2. Lack of technical knowledge to download and access the learning app
3. Poor network connectivity at home
4. Parent literacy levels which inhibit engagement

These challenges are all capable of being dealt with, and some of them will resolve themselves without direct intervention (as smartphone accessibility generally improves). We also note that take-up does not address those without smartphones. Whilst we attempted to ensure some support mechanisms were in place for those parents without access to a smartphone – recognising the need to try to address at-home learning for all children in a community – we nevertheless strongly advocate that a digital approach to at home learning is vital in marginalised settings.

Key finding 4 – Parents will engage in literacy learning for their children in marginalised settings. There is enough evidence from our preliminary work to suggest schools should be encouraged and supported to create this important bridge to at-home learning. The digital network of smartphones is growing (our data indicated that c.40% of households in iMlango's marginalised communities had access to a smart phone), and that asset will continue to grow. New innovative approaches are needed to take advantage of this in a literacy learning context, whilst continuing to support non-digital initiatives for those who do not have access.

Establishing a learning model at home

We share here (and with the benefit of hindsight) some of the issues that should be considered in establishing the at-home model. They include;

- How should an at-home learning app be used?
- What approach within the app itself makes most sense for supporting literacy e.g. short sub-lessons or story books broken down by chapter to fit with limited time slots?

[2] We found that traditional evaluation approaches can be too quick to dismiss an initiative such as *iMlango at-home* if they just focus on absolute uptake, without taking time to understand the underlying field issues at play.

- What interactivity should be included, and what online vs offline functionality should be available?
- What timeslots should be encouraged for regular learning at home?
- In households with multiple children, how should access be shared?
- What role should parents play in supporting learning (other than making the smartphone available)?
- What role should teachers play in reaching into and supporting an at-home learning environment?

Jane Kerubo (*not her real name*), is a class six pupils at SDA Segero Primary school. She is the second born in a family of three siblings, she schools with her younger brother Elvin Kwamboka who is in Grade 4. Her elder brother is a form 2 student. Her father works at a research institution and her mother is a business lady and they are both working from home during this pandemic. Since both parents are working from home, they are therefore able to monitor their children's activities.

Her parents have assigned her some household chores in the morning and her learning timetable begins at 12PM – 2PM every day. She uses one hour to learn through the iMlango at-home learning app and the other hour on other learning materials for her schoolwork.

Mr. Kembeya, her father applauds the new iMlango adaptation for through the App his children are fully engaged. ''I *can say my children are lucky to have continued learning during this pandemic for I know most of neighbors' children are not. I always ensure Kerubo and her brother Elvis spend equal time learning through the app on a daily basis. I like the fact that there are a variety of stories to read from and I don't have to buy extra storybooks to improve her composition writing skills during this hardship times of COVID-19*".

It is too early for us to answer all these questions with a recommended or best practice approach. We feel that at-home digitally-enabled learning is a new 'white space' where technology and educationalists should come together to explore and establish what works. We favour more effort to understand the way these different factors and issues inter-relate, to build a model for future expansion and investigation. This white space should encourage each school to explore, making their situation-specific recommendations to parents for this non-school environment, and encouraging different approaches by individual teachers towards home learning.

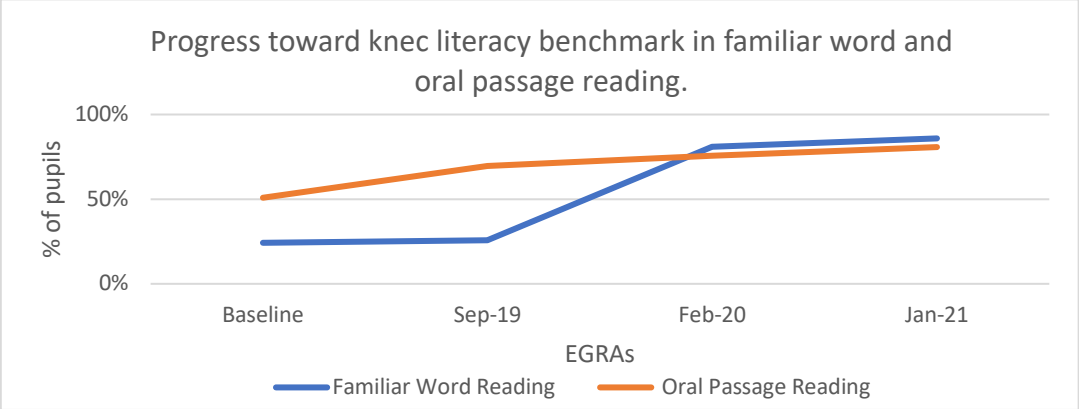
Key finding 5 – iMlango established a pilot pathway for at-home literacy learning using a digital tool, in marginalised environments. The issues are now clearer, and the opportunity is significant. A white space is fast emerging, created by parental smartphone access, and we advocate building on our early findings to create initiatives that will create a real contribution to the literacy outcomes of children in these settings.

iMlango impact on literacy outcomes

In this section, we present the literacy outcomes of iMlango intervention in comparison with the benchmarks set by Kenya National Examinations Council (KNEC) and the Ministry of Education (MoE) in 2012.

Figure 6.

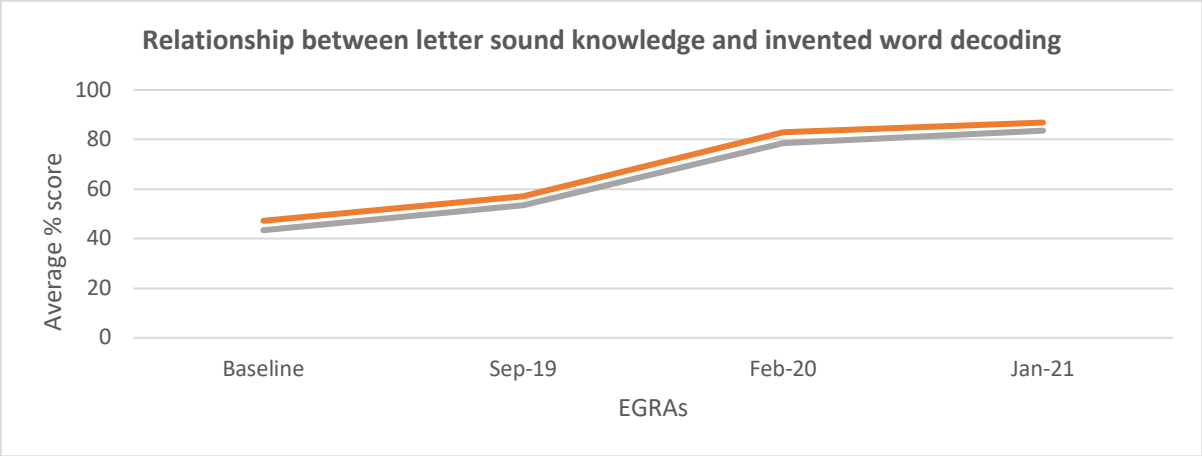
Early grade reading progress towards KNEC benchmark.



The benchmarks for fluent reader are set at 65 correct-words-per-minute (CWPM) and 30 CWPM for emergent reader. The above graph shows the gains made by pupils relative to the baseline survey conducted in 2015, where 50% of the learners surveyed were reading at the KNEC benchmark in oral passage reading and 25% in familiar word reading. In September 2019, oral passage reading had improved by 20% to 70% of sample. In the February 2020 Early Grade Reading Assessment, (EGRA), learners recorded a 69% improvement in familiar word reading. Between February 2020 and January 2021, the rate of improvement slows, reflecting the disruption arising from the closure of schools due to covid.

Figure 7.

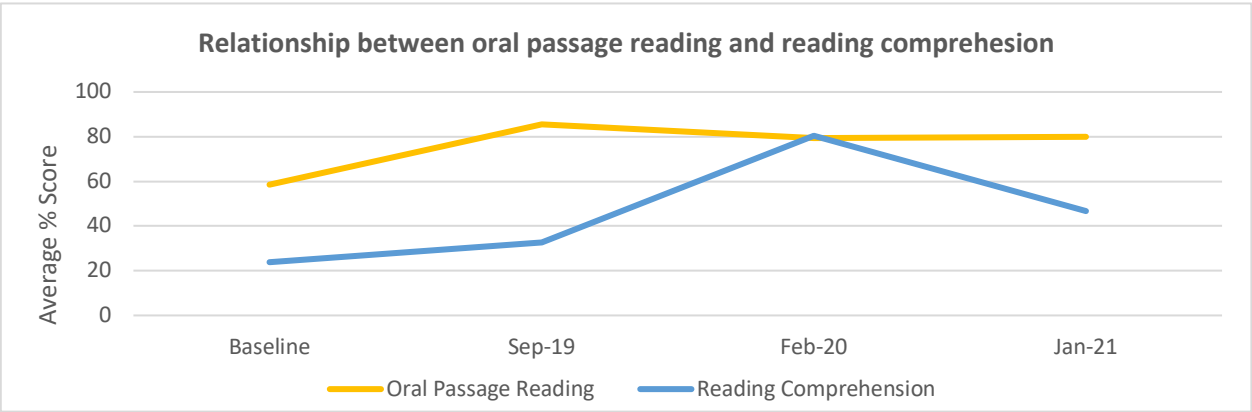
Progress in letter sound knowledge ad invented word reading.



The Kenyan reading curriculum emphasizes the use of the alphabet or letter name in early grade reading instruction. In iMlango, our programme assisted teachers in using the phonological awareness approach to teach reading. Research supports the use of phonics because the sound has a more direct influence on reading than the letter name. Our data shows improved learning in letter sound knowledge and invented word decoding (the measure of fluency in letter sound knowledge).

Figure 8.

Progress in passage reading and reading comprehension.



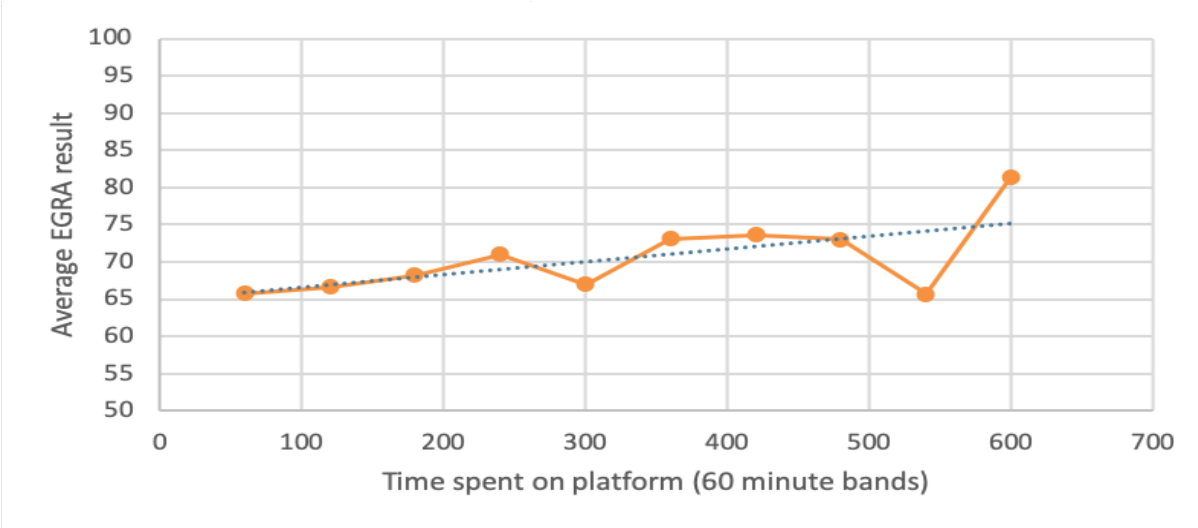
Comprehension ability is one of the biggest challenges in becoming literate. Performance in the Kenya Certificate of Primary Education (KCPE) exams tends to indicate an improvement in reading fluency often does not lead to improved comprehension. Our data showed good progress vs baseline (notwithstanding a likely covid-driven impact of reduced comprehension in our January 2021 data). Clearly, literacy teaching should include comprehension strategies - in our case, learners are trained

on picture walk, identifying various types of comprehension questions and how to tackle them, all supported through the digital resources.

One of the early challenges set by our sponsors in iMlango was to identify any direct link between time on task (measured by access to digital resources) and literacy improvement. There are of course so many variables that impact on this, and even the measurement itself is not wholly reliable – for example, in a whole class environment, it is very difficult to measure a student's learning time in a meaningful way. Add to that the very different standards in teaching across the cohort of schools, and possible linkages become even harder to assess. However, one interesting observation from the data was apparent – when we plotted student total logged-in time spent on the platform (just literacy content viewed) during computer lab sessions against EGRA results for the students that took the assessment in January/February 2020 we found a slight positive correlation.

Figure 9.

Average EGRA results compared with student time engaged in digital literacy content.



What conclusion might we draw from this? Tentatively, it is possible that students with increased learning portal time may be more engaged in learning, and as a consequence of that engagement, they make better progress in literacy. This seems logical, and is supported by observations, but it needs further work to prove a definitive link. However, if such further work finds low or no correlation, would it then be an argument to stop the provision of digital resources? Given all the other evidence, could it really make sense to hold back digital resources if a strong linear link is not found?

Key finding 6 – iMlango can point to clear positive trends in literacy improvement through its data, supported by qualitative observations, such as a 20% improvement in oral passage reading ability when compared to the baseline rate. These data trends alone do not make the case for digital platforms but add to the body of evidence from the programme that a collective positive momentum towards literacy and digital literacy improvement has begun.

What held us back?

We articulated earlier in this Chapter some of the teacher-specific challenges associated with improving literacy teaching and learning assisted by digital tools, and improving digital literacy as a 21st century skill. Whilst there is a huge amount of positive progress emerging from iMlango, over the duration of our programme we have also seen at first-hand a pattern of missed opportunity that has roots embedded in more fundamental issues. In marginalised environments we highlight:

1. **The lack of a closely knit whole school system**: gaps exist in bringing together the BoM, Parents' Associations, government officials and community leaders to form a community of

good practice centred around a school. We are encouraged by the willingness of parents to engage when asked, and whilst not universal, we believe there is opportunity and need to develop this further;

2. **The disconnect between curriculum demands against the requirements of 21st century teaching and learning skills**: many schools are still focused on traditional teaching methods that sees teachers spending much of their time drilling learners for exams. The change of curriculum in Kenya is beginning to address this, but teacher capacity improvement needs more focus to help the transition;
3. **The quality and range of teacher initial pre-service training**: teaching literacy in isolation from teaching language is a new approach for many teachers. Ensuring teachers are competent in using technology to access and maximise available digital resources is something that could be addressed in early training;
4. **The limited ability to use data to assist teaching strategies in large classes**: throughout the programme we observed teachers lack of ease in looking at or handling data. This included both attendance data (where we encouraged basic clustering analysis of students, to identify groups with attendance issues), and using basic tools to categorize learners into reading competence groups with a view to then offering individualized/clustered learning. We think the ability to assess and use data is critical in ensuring future progress;
5. **The disconnect between education theory, policy, and practice**: teaching and learning using technology and the need to improve learning outcomes in literacy is well articulated in education blueprints. However, there remain significant gaps in helping the teacher manage effective delivery at the classroom level. Although some progress has been made, the support from the regional education system is limited and after some seven years we remain concerned that new teachers to the iMlango programme still needed significant support in digital tools and best practice literacy teaching.

Key finding 7 – We identified 5 key but surmountable barriers to making significant literacy and digital literacy progress in schools and recommend that these be carefully considered in designing future programmes. The barriers are:

- Lack of a whole school system including the local community
- Disconnect between curriculum demands and the need for 21st century teaching and learning skills
- Quality and range of teacher pre-service training
- Limited ability of teachers to use data to assist teaching strategies in large classes
- Disconnect between education theory, policy and practice

Chapter 3: Emergence of a best practice literacy model from iMlango

From the huge amount of data and observation of working practices that we obtained through iMlango we begin to see a template for best practice emerging. We think that template includes:

1.Recognise teacher reluctance - Develop teacher confidence in use of ICT for teaching and learning

At the inception of the project, we observed that many teachers were reluctant to use the tools - we called it technophobia but in reality it was lack of familiarity, and therefore confidence. The first step therefore is to recognise and classify teachers as those who are progressive, progressing or challenged. The progress of the teachers will depend on their interest and personal initiative, their current experience, and we need to recognise the different start-points, in the same way as we recognise the different levels of readers.

Digital support mechanisms, using smartphones especially, could make a significant impact in helping teachers.

2.Establish English subject panels

When we started our literacy intervention, we found some schools did not have subject panels and where they existed, they were weak and dysfunctional. We helped schools establish or revive English subject panels, becoming focal points where literacy teachers can meet to share notes on good practise and assist each other, and through these we could also provide field team instruction away from teachers of other subjects. In many cases, we have seen head teachers are now using them as forums for subject management under a head of department.

There may be a role for a digital support mechanism here, allowing panels to reach beyond the school boundary to seek best practice, etc.

3.Make the digital content relevant and helpful for literacy, and have the teachers contribute

Teachers depended on textbooks – invariably too few of them, and it can be hard to manage learner concentration in a large class environment. We focused on delivering digital content with helpful stories, brought to life with colour and able to present well to the whole class on a projector, as well as for individual computer-based learning, and we sourced an online children's encyclopaedia to help open up enquiry-based learning for all subjects. We added teacher guides and questions that could be used in the classroom to help bring the lesson to life.

We managed to work with teachers to develop literacy lesson guides and we are in the process of helping them develop comprehension essays and stories to be uploaded into the portal. Teachers are also involved in categorization of online content to suite learner levels.

We encouraged audio podcasts to improve learners listening, reading, vocabulary and comprehension skills. Audio podcasts are embedded in the learning platform alongside the books, and are available on the downloadable app too.

Teacher feedback on our digital encyclopaedia indicated they were time constrained to search the encyclopaedia in a whole class setting. We curated the Q files encyclopaedia with the subject content in science and social studies and provided the teachers with quick reference on the portal to improve accessibility.

In summary, we see digital content as a 'live service' one that should be curated and evolved. It is for this reason that we strongly advocate online strategies, as adopted in more advanced countries. In fact, our preliminary analysis suggest that on a fully costed basis, online is cheaper to deliver vs offline, and adds the dynamic dimension.

4.Encourage the use of data for decision making

We found teachers relatively unfamiliar with quantitative tools – using data to assist them in their teaching approach. We encouraged teachers to access and use the tools we provided – attendance data to help them understand the likely spread of ability in their class, and more specifically to look at EGRA testing to assess the children's reader categories. We still have a long way to go, but we believe that literacy improvement will logically create a more engaged student, who is also more likely to find school enjoyable and thus attend more regularly (accepting that other factors also affect attendance). This should have a knock-on effect into all subjects.

We advocate helping to build capacity in using data tools for teachers, using a smart-phone based approach as an accessible route to deliver assistance.

5.Build strong school community linkages and encourage at-home engagement in literacy

Learning of literacy is an activity that should not be left at the school gate. We think all schools should support an initiative in literacy that extends to parents too. Our engagement with parents and communities has been on the premise that literacy is culturally desirable and sustains the community and that reading at home improves reading competence among learners, therefore helping those communities.

We believe that smartphone based at-home learning initiatives should be encouraged and resourced in marginalised communities.

6.Build support from county, sub county and zonal government education officials

We encourage the building of stronger connections between government education officers especially the zonal curriculum support officers, and the schools, in the literacy and digital literacy agenda. They should give teachers classroom support and feedback as part of their routine tasks, and they can help to reinforce the importance of using the digital tools. Ultimately, they should take on the 'ownership' of the digital learning challenge within their schools, and encourage the teaching staff to embrace the tools and the use of the data that will ultimately help drive progress.

What makes a good field team to support a programme such as iMlango?

We were conscious throughout the iMlango programme that we were there as guests of the Ministry of Education in the schools, and that our role was always one of guidance, not with a mandate.

As we learned more about the challenges, we extended and adapted the capacity of field teams to better support teachers, transforming their role from primarily technical (ensuring services were working) to primarily educator support. We built their skills to include lesson planning, understanding the components of literacy, lesson modelling, early grade reading assessment protocols and procedures, in-classroom support for teachers, and building community engagement. We developed a field team training module to help them, encompassing literacy teaching research, understanding reader competence, how children read, etc.

The model we evolved provides some recommendations for future scaling initiatives. For a large digital programme, the skills needed evolve as the programme matures through initiation, rollout, and into ongoing deliver/improvement, and we strongly recommend that a clear operational focus is in place for each of these phases. Driving a digital literacy initiative should be regarded as a change programme, and the change agent (primarily the programme) and the change recipient (primarily the teacher are at the centre of that). Building rapport between the two, with appropriate support mechanisms, especially through education officials, is vital for success.

Chapter 4: Lessons we learned

With data gathered over seven years across more than 200 schools, the amount of data and insights is significant. In this chapter we consider the key lessons that we take forward on improving quality in teaching and learning literacy, and driving digital literacy.

Technology – does it make a difference?

We think this is the wrong question, yet throughout the project we had frequent challenges from educationalists that we must prove that the technology was able to directly improve the learning outcomes, and do so more efficiently than 'traditional' means.

This approach seems embedded in current pedagogical thinking – education experts desire a body of control group referenced proof that technology improves the learning experience compared to current practice. Experts look for reasons not to adopt, rather than reasons to adopt, if impact is not clear. As an example, we saw members of both sponsor and evaluation teams look at the at-home initiative only through the lens of uptake numbers, thus drawing very different conclusions on what we regard as a key positive finding to have emerged from iMlango.

We therefore encourage a pause in the approach on technology evaluation, and encourage assessors to look around and beyond the data – consider the juxtaposition of a fully digital, connected assessor who on the journey to a school is managing any number of digital inputs and outputs, but on arrival puts their smartphone in their pocket and looks at how the project is implementing a digitally-enabled lesson. They might find limited evidence of a positive impact in their single visit. They then note those differences digitally. Reflecting on this, our own behaviours and uses of technology embrace its growing influence in all aspects of life. On the journey to the school, in the local community, the observer can see the pace of penetration and change that digital connected technology is bringing even in marginalised and currently under-served settings. Technology is here and we need to find ways to leverage it, treating each step as a positive, and learning from it. We think that digital technology should not be marginalised because it cannot categorically demonstrate education excellence.

There exists a thin line between 'edtech' and 'tech in education' practise. If *Education Technology* is the combination of education theory and practise with technology as an enabler for teaching and learning, then it is our observation that this is new 'white space'. Technology providers can provide the platforms, but the pedagogy is only emerging slowly. On the other side, the pedagogical experts often lack ability to understand the potential of technology, so they are inclined to assess effectiveness against their 'analogue' terms of reference.

We see some creative tension emerging - between the technology experts without education backgrounds infiltrating the education space, and the traditional education experts holding back on endorsing technology. In between are the ministries who remain unsure (and possibly resource constrained) on technology investment and deployment. And the consequence? Teachers with education knowledge are not so well encouraged to acquire technical skills to deliver lessons, and recruitment and training of teachers around the digital need is at risk of continuing to fall short.

Lessons learned 1 – Embrace the digital white space

We advocate decision-makers adopt a new mind-set in the digital education white space, seeking to embrace positive steps and constantly looking to improve through being open to digital innovation. We encourage policy makers to partner with digital players, and together seek rapid outcome led change in enabling children to flourish in literacy and digital literacy.

Literacy content in digital format

We think this is a journey. The digital medium creates the opportunity to provide educationally focused and creative delivery. It is a new environment for exploitation by the progressive, confident and digitally capable teacher. We should encourage it.

At the simplest level, content should have a direct relationship with the national curriculum themes and help learners prepare for national summative tests. Apart from offering supplementary reading materials, it should also include material from course book publishers for each grade level. Considering the development stages of the learners, content should be easy to access and put into multimedia audio, visual and audio-visual formats.

Moving forward, it should make learning more stimulating – that means it can be fun and exciting with animations and simulations. The format also means that it can be swiftly adapted and in our view it should incorporate local themes and stories relevant to learners' experiences. But to achieve this, it must have a teacher confident and able to embrace a different teaching style.

We believe the role of the education ministry should also adapt to be more progressive and opening up new ideas, to allow innovation to take hold. Curriculum focus must be maintained, but where new scope for learning becomes possible – at home learning platforms, school-clubs allowing digital access, etc, there is room for this innovation to flourish and for new best practice tools in the digital white space to emerge.

Core curriculum activity

Teaching and learning of literacy using technology should be incorporated into the official teaching routine and viewed as a core curriculum activity and not as a separate peripheral endeavour for teachers who wish to undertake it.

We recommend that computer labs where they are available should be viewed as school libraries where learners practise reading under the supervision of the teacher during library lessons. We recommend whole class sessions leveraging digital tools are held under the reading lessons as indicated in the timetables, and supported by teachers schemes of work and lesson plans.

Lessons learned 2 – Allow good content to emerge in new digital formats. Ensure alignment of content with curriculum, but also allow teachers and students to explore and experience new ideas that may become transformative.

We further recommend that the duration of the whole class reading lessons and lab library lessons be longer, allowing time for set up of computers and occasional trouble shooting issues. This might be achieved by timetabling them at the beginning of the school day or after a break, so as to give preparation time.

Lessons learned 3 – Access
Adopting digital formats needs flexibility within the school timetable and allow for set-up time in lesson planning. Where computer labs are available, ensure schools maximise the opportunity of students to learn, through school clubs, etc. Encourage use of ever-growing smartphone networks to enhance the teaching and learning experience.

Teacher support and professional development

Teacher training to teach literacy using technology is a complex issue that requires concerted efforts involving all stakeholders. It should start at pre-service training and cascade to continuous professional development. We have observed that building systems around in-school peer teacher support and mentorship yields better results than relying entirely on external support. Teacher training to teach literacy using technology should be organized around subject panels where modelling

and practise are emphasized. Further, having brief external trainings with follow up and refresher meetings is more effective than longer training sessions. This naturally leads us to considering teacher CPD itself as a candidate for a digital micro-lesson type of approach.

Change of teaching approaches and mindset

Old habits take time to change, and the shift from traditional teaching to more active, sequenced, pupil-focused approach is central to teaching and learning literacy using technology. This calls for passion and intrinsic motivation, but also requires understanding - teachers need to *understand* the reading competence of their learners and appreciate the importance of learners reading at their particular grade level. Teachers need to understand and value the role of the technology platform in teaching and learning, and support programmes that focus on this will likely drive more rapid change in teachers' instructional approaches.

Teacher supervision

Supporting teachers in classroom teaching of literacy using technology is also a journey. Although teachers are theoretically highly trained and experienced professionals, in practice standards vary enormously. Teaching literacy using technology requires that teachers should unlearn old and learn new teaching strategies and methods. Because old habits die hard, teachers need close administrative supervision from education officials and head teachers. The endeavour needs engagement from within a school. Project staff are usually not able to enforce teacher compliance to change. Digital tools accessible on smartphone, that help build teacher capacity and support them more readily, are desperately needed.

Teaching literacy to large classes using technology

Time (for learning), human resource (to teach), and infrastructure (to leverage and accommodate ever-growing numbers of students) are the major challenges facing schools in sub–Saharan African countries. Teaching literacy using technology provides the opportunity for helping teachers in the large whole class environment.

Lessons learned 4 – Teacher-centric thinking
Actively manage capacity building amongst teachers in use of digital tools, with comprehensive pre-service and in-service modules. Implement them in digital formats, leveraging e.g., smartphones, to normalise digital thinking in the teaching environment. Support this with school-level mentoring and review, and encourage teachers to participate in advancement of learning tools – what works, what does not work, etc.

The role of the teacher in using technology in teaching and learning

A hands-on approach by teachers is essential for leveraging digital resources in teaching and learning, and their voice also needs to be heard. Teacher capacity building tools should work alongside learner content and monitoring should be used to refine and improve these digital tools to meet the needs and recommendations of teachers. This can only be achieved by ensuring that ICT skills are a focus in all teachers.

Use of data in decision making and informing teaching and learning progress

Data collection, analysis and presentation is key in helping to signpost, plan and measure progress. We remain a strong advocate of an online approach, accepting that there can be difficulties in ensuring connectivity, but without online, the data and management task is arguably too great, and data systems will fail.

Real-time data on learner achievements and teacher progress should be an integral part of a successful digitally supported literacy programme. To make the most of this, a strong monitoring and evaluation mechanism and culture within is needed, helping create the desire to use data in decision making, and to use it quickly, in near real time.

Lessons learned 5 – Adopt data at the class level
Online digital platforms provide a wealth of data for a teacher and a school. Distributing information to help teachers focus on learner groups for literacy and other subjects can rapidly improve literacy learning amongst learners.

Leveraging on learners' enthusiasm and inherent liking for technology

Our observation from the iMlango project is that learners are very enthusiastic and eager to use technology in learning. They are very curious and ready to explore the digital content as it makes their learning fun filled and rewarding. Education stakeholders should build ICT driven education interventions around the child-centred approach. For example, learners can set up equipment and help teachers to save time for lesson delivery.

The use of whole school and whole community approach

Our observation is that a successful teaching and learning strategy using ICT should involve all the stakeholders using the whole school approach. No stakeholder should work in isolation. These include the parents, teachers, education officials and the head teachers. We would like to see initiatives that encourage at home reading using digital tools, building closer engagement of parents in their children's learning.

Lessons learned 6 – Children will embrace digital tools
We strongly advocate policy to provide opportunity in marginalised settings to further help children build their digital literacy through in-school and out-of-school digital tools. We should do everything possible to encourage their participation.

Using the cascade capacity building model

It is a big challenge to have all teachers and learners move at the same level in terms of improving teaching methods and learning outcomes. It is our observation that training focal teachers and child champions can help cascade learning to their peers and help to save time. It is a sure way to build a pool of champions that can be reached easily for support at school level.

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