AUGUST 2023

LEARNING BRIEF #9

Using technology to improve girls' learning

Girls' Education Challenge

UKaid from the British people

The Girls' Education Challenge (GEC) is the UK Foreign, Commonwealth and Development Office's 12-year, £855 million Global Fund which aims to improve the educational opportunities of the world's most marginalised girls. The GEC is comprised of two types of project: 1) GEC-Transition (GEC-T) projects, which work within schools and support girls most at risk of dropping out; and 2) Leave No Girl Behind (LNGB) projects, which target highly marginalised girls who have already dropped out or who have never been able to enrol in school.

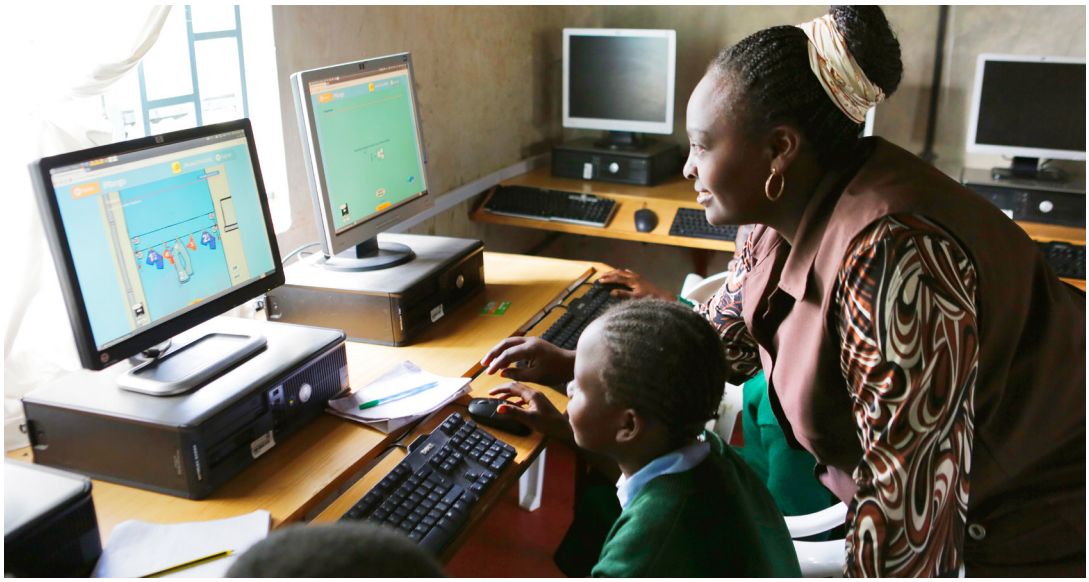
In recent decades, there has been a growing interest in the use of technology to drive educational improvement. Of particular interest is how educational technology (EdTech) can drive improvements in low resource environments and be used in a way that does not exacerbate education inequality. However, robust impartial evidence on the impact of EdTech is lacking and is particularly scarce in low resource contexts.[1]

As GEC projects aim to reach highly marginalised girls with education interventions, including through the implementation of targeted EdTech solutions, there is an opportunity to draw out some learning on how EdTech can work in low resource contexts for the most disadvantaged.

This Learning Brief looks at some of the EdTech approaches, factors of success and lessons learned across GEC projects. It draws largely from a research article written by EdTech Hub in collaboration with the GEC that examined the factors that have facilitated the effective delivery of EdTech interventions and contributed to successful outcomes across the GEC portfolio. This research focuses particularly on six projects that have had positive outcomes. This brief heavily draws on this research as well as learnings across other GEC projects.

The six projects on which the research focuses are:

- Discovery Project – Ghana, Kenya and Nigeria
- Expanding Inclusive Education for Girls with Disabilities (IE) – Kenya
- GEARR-ing Up for Success After School (GEARR) – Uganda
- iMlango – Kenya
- Let Our Girls Succeed (Wasichana Wetu Wafaulu – WWW) – Kenya
- Making Ghanaian Girls Great! (or MGCubed) – Ghana



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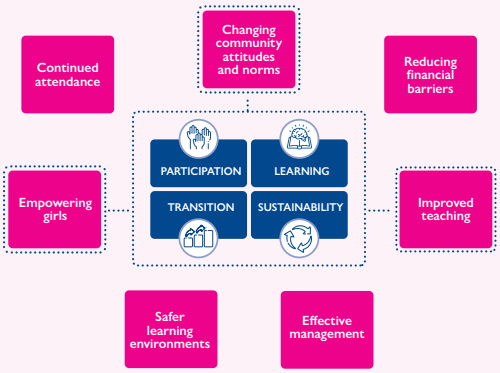
[1] UNESCO (2023) Global Monitoring Report

The Girls' Education Challenge Learning Brief series:
To capitalise on its vast portfolio of 41 projects, operating across 17 countries, the Girls' Education Challenge (GEC) has compiled a wealth of project learning regarding key interventions related to girls' education. While these Learning Briefs are rooted in both quantitative and qualitative evidence, they are not research papers or evidence reports. Rather, they provide a synthesis of learning from GEC intervention designs and implementation approaches that have been paramount for supporting improvements in girls' learning. The GEC projects take a holistic approach to improve the educational environment and conditions that support improved learning, participation, transition and sustainability outcomes. This Learning Brief is focused on interventions in the following areas:



Technology and education

It is now widely recognised that technology is not a panacea. Technology should not be viewed as an isolated driver of change in education initiatives but instead needs to be integrated within holistic education programmes. Using technology alone generally does not positively impact on learning. However, as outlined in the recent UNESCO Global Monitoring Report: *'some education technology can improve some types of learning in some contexts'*.[2] For example, low technology solutions such as radio and television can be used to reach learners in remote and hard-to-reach areas where access to formal education is more limited. In addition, EdTech has been associated with a range of potential educational benefits in low and middle-income countries (LMICs). These include: increasing vital student-teacher interaction; disproportionately benefitting low attaining pupils: facilitating personalised learning through adaptability; and promoting out-of-school learning.[3]

Providing equitable access to quality education for girls is a well-documented, significant challenge and an agreed priority within the international education donor community. Worldwide, there are more than 129 million girls out of school, including 32 million of primary school age, 30 million of lower-secondary school age, and 67 million of upper-secondary school age.[4] Globally, school enrolment rates are getting closer to equal for girls and boys (90% male, 89% female), however, completion rates for girls are lower in low-income countries. For example, in low-income countries, secondary school completion rates for girls are 36% of girls for lower secondary school, compared to 44% of boys.[5] Overcrowded schools and poor quality of education can push both boys and girls out of school, but for girls there are added challenges. Socio-cultural attitudes are a barrier, as girls are often expected to prioritise domestic duties or early marriage instead of pursuing an education.

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Because girls are more educationally disadvantaged than boys and are more likely to be out of school, conversely, they may stand the most to benefit from inclusive EdTech interventions. The use of technology within education may offer alternative means for some girls to access and make progress in education. In many GEC projects it has been used to assist girls who are marginalised and who face the greatest barriers to accessing good quality education. A small number of studies have considered the impact of EdTech solutions specifically on girls in LMICs. One rapid evidence review found that access to technology in education is often disproportionately more empowering for girls and women than for boys and men and that it may include benefits in other areas, such as an increase in access to economic opportunities and a greater ability to make informed decisions about their health.[6] Another study found that EdTech may be useful for mitigating gender differences in attainment in countries where standard pedagogical instruction may be biased and prevent girls from learning at the same rate as boys.[7]

EdTech became even more important as schools closed due to COVID-19. Evidence is steadily building to suggest that inequality of access to education for girls intensified during the COVID-19 pandemic, arguably in large part due to the increased reliance on technology for learning access, from which girls in LMICs are often disproportionately excluded.[8] Learning loss became a significant problem, with disproportionate learning loss often amongst girls and learners from disadvantaged background such as those living in rural areas, and children and young people with disabilities.

As EdTech interventions become more commonplace, it is critical to consider the potential of technology for educational purposes with caution. This is particularly important in LMICs where girls have typically been less likely to access conventional education and where technology has the potential to exacerbate access and equity issues for girls' education due to access constraints. There is an ongoing, significant and complex set of gender digital divides in LMICs, which are often rooted in cultural gender bias. It is for this reason that, when developing and delivering EdTech interventions, infrastructural limitations must be carefully considered, interventions must be contextually appropriate and applied according to sound pedagogical principles and equity must be foregrounded.[9]

"Because girls are more educationally disadvantaged than boys and are more likely to be out of school, conversely, they may stand the most to benefit from inclusive EdTech interventions."

[2] UNESCO (2023) Global Monitoring Report

[3] Tauson, M., & Stannard, L. (2018). EdTech for learning in emergencies and displaced settings: A rigorous review and narrative synthesis. Save the Children.

[4] https://www.unicef.org/education/girls-education

[5] https://www.worldbank.org/en/topic/girlseducation

[6] Webb, D., Barringer, K., Torrance, R., and Mitchell, J. (2020). Girls' Education Rapid Evidence Review. EdTech Hub

[7] Pitchford, N. J., Chigeda, A., & Hubber, P. J. (2019). Interactive apps prevent gender discrepancies in early-grade mathematics in a low-income country in sub-Saharan Africa. Developmental Science, 22(5), e12864

[8] Crompton, H., Chigona, A., Jordan, K., and Myers, C. (2021). Inequalities in Girls' Learning Opportunities Via EdTech: Addressing the Challenge of Covid-19. EdTech Hub

[9] Using Technology to Improve Education for Marginalised Girls: Lessons in implementation from the Girls' Education Challenge. (2023). [Preprint]. EdTech Hub

GEC project approaches and effects

As illustrated in *Figure 1*, there are several EdTech modalities that projects have used such as radio, mobile phones, computers (for example computer labs for students or the provision of laptops or tablets for teachers) and TVs or projectors. In some cases, projects have provided internet connectivity and in others they have provided assistive technology for learners with disabilities. Sometimes a mixture of these modalities were used, often alongside paper-based materials. EdTech approaches have changed throughout the lifetime of projects depending on the needs of the girls and on external factors such as COVID-19. As a result of COVID-19, many projects adapted their EdTech approaches – or introduced new ones – as there was an immediate need to reach learners with distance teaching and learning when schools closed. While EdTech approaches were generally used by projects to directly improve learning outcomes, technology was also used for other project activities such as monitoring and evaluation and community outreach and awareness raising.

This section outlines some of the EdTech approaches used under the different modalities and how they were adopted (or introduced) during COVID-19.

Radio

Radio is one of the most suitable modalities for distance education in low resource settings due to the high prevalence of radio sets globally and its low cost. Across GEC projects, activities have included the development and broadcasting of radio programmes – both in academic subjects such as literacy and numeracy, and in life skills. While many projects used radio before COVID-19, its use became much more common as schools closed. Not only was it a modality to reach learners with academic content, but also with well-being, health and life skills content which was particularly important as learners were isolated with many facing strains on their mental health. For example, the Discovery Project adapted the *My Better World* (MBW) life skills curriculum during COVID-19 from print to radio in Wajir, Kenya, and Kano, Nigeria, and the IE project broadcast programmes on health and well-being on the local radio. The GEARR project introduced radio lessons during COVID-19 and broadcast them at the district level.

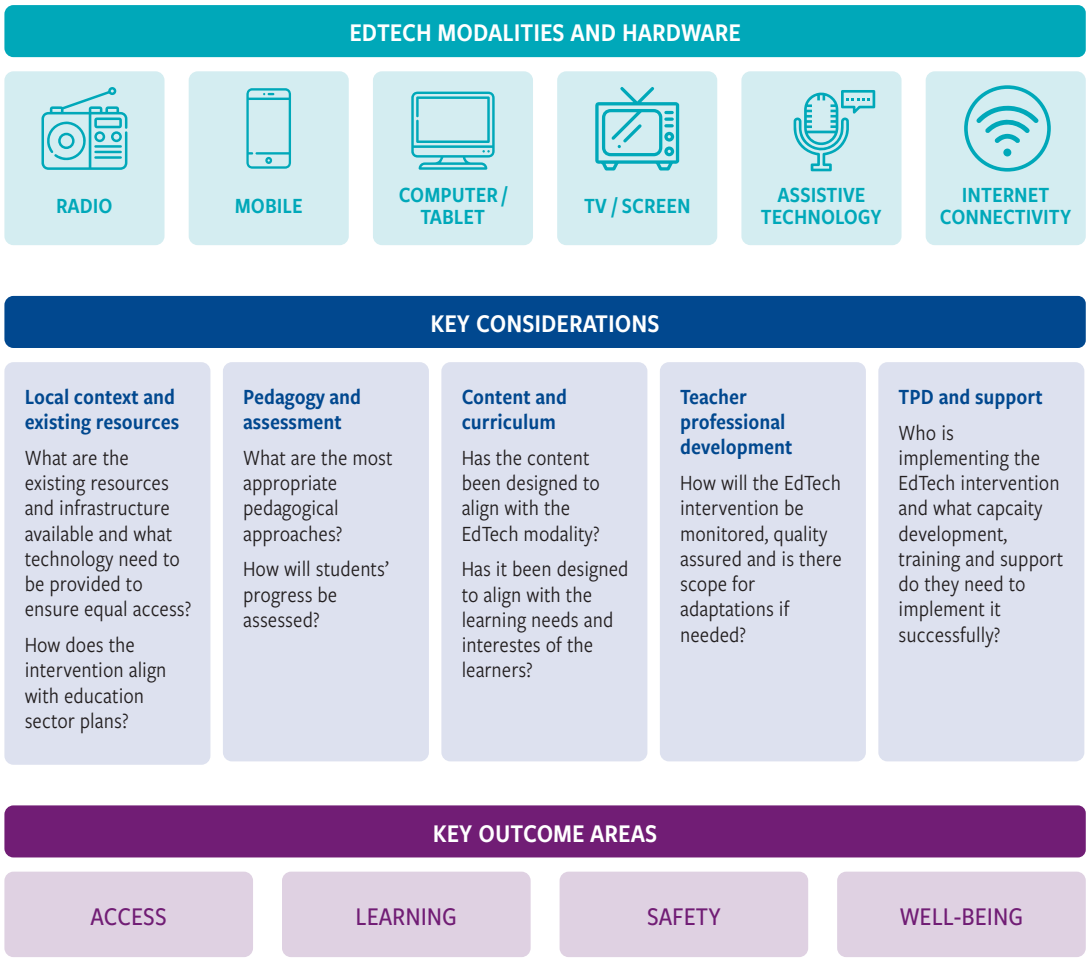

Figure 1: *EdTech interventions, modalities and key considerations across the GEC*

Many projects distributed radio sets. The IE project distributed solar radio sets to children with visual impairments and vulnerable households. Some projects targeted caregivers through their radio talk shows. For example, WWW developed local radio talk shows to guide caregivers on how to support girls' learning at home. Many GEC projects worked closely with governments, inputting to the development of national radio programmes, helping to ensure that it was gender sensitive and inclusive. Projects also conducted awareness raising at the community level on government radio lessons, creating awareness on the timetables and encouraging families to let girls have the radios and allow them the time to listen to the programmes.

Many of these radio programme activities were implemented with other activities such as the distribution of paper-based material for learning, and facilitated community-based learning in smaller groups (when protocols allowed). The WWW project found that combining radio programmes with these activities was much more effective.

Mobile phones

Mobile phones can be a useful educational tool in certain contexts and this was particularly the case during COVID-19. GEC projects have used phones with both students and teachers – and in some cases with caregivers. For example, GEARR and KEEP both piloted an SMS learning tool which targeted girls and could be used with a basic phone. iMlango developed an android app so that their platform could still be accessed during COVID-19. There were often access issues (particularly with the android app) across projects as they did not always have access to phones. The Discovery Project created English and mathematics courses for girls through the Cell-Ed platform, which students could access through caregivers' phones. The majority of projects used phone calls to stay in touch with girls when schools were closed and to check in on their well-being, encourage them to continue with learning, signpost them to learning opportunities such as radio broadcasts and, in some cases, teachers held learning conversations via phones.

CASE STUDY: Sisters for Sisters' Education, Nepal: Expanding the reach of radio programmes during COVID-19

The English and Digital for Girls' Education (EDGE) component of the Sisters for Sisters' Education project supported 1,350 adolescent girls through Girls' Clubs. Before COVID-19 they had been using radio to enhance teaching and learning. In response to COVID-19, the project took advantage of their work in this area and expanded and further developed the radio component, which resulted in much wider engagement and reach. The project created several radio programmes which were developed by subject specialists to support girls in their continued learning. They also prioritised social issues. Building upon existing resources, the development of the radio programmes and the associated materials followed a rigorous process. Teachers who had a deep understanding of the learning needs and the social issues facing girls were the curators of the content. Local, Nepalese writers with specific expertise in producing stories for audio/radio developed the content. The storylines, characters and exercises were thoughtfully created to help learners explore complex and challenging social issues. The approach involved the weekly broadcast of radio and television programmes centred around gender equality, social issues and English language development. Now embedded into the government system, the resource is accessible to 7.3 million students and 147,000 teachers across Nepal.

CASE STUDY: KEEP project, Kenya: Mobile technology for remedial learning

The KEEP project in Kenya initially introduced the Eneza platform as a learning tool for girls who were behind or struggling with learning (those that were attending remedial lessons). The platform could be accessed via a basic phone and had different learning tools such as access to exam and revision papers, mini tutorials and multiple-choice quizzes. There was also a two-way platform with teachers where learners could ask questions if they did not understand a topic or wanted clarification. The aim was to help girls catch up on content that they had missed, help them access revision material, consolidate learning, practice skills and prepare for exams. As outlined in a project document: 'Sometimes, due to huge classes in regular schools, one on one sessions with the learners can be hard to facilitate but the app helps with this, especially on ask a teacher giving feedback to each learner.'

During COVID-19, the project expanded access to the platform beyond just the girls attending remedial classes to all project girls as a way of continuing their learning when schools closed.

Some projects also used mobile technology when working with teachers and caregivers. For example, the Discovery Project delivered teacher professional development through the Cell-Ed platform to teachers, and SAGE in Zimbabwe used WhatsApp (often alongside Zoom and paper-based materials) to deliver training to teachers when schools were closed. IGATE and WWW used SMS to deliver learning material to caregivers and community facilitators that could then be used with learners in homes and communities. SMS was also an important way of distributing health messaging related to COVID-19 to teachers, community workers and caregivers.

Computer (or tablet) and television (or projector screen)

There are several projects that have used computers or tablets and TVs or projector screens. For example, WWW distributed tablets and projectors to schools as part of a strategy of integration of ICT for learning in classrooms, and for the digital monitoring of learners' attendance. The Discovery Project created media centres in schools equipping them with smart TVs and DVD players, educational video content, including life skills through the MBW series, literacy and numeracy, and other subject content. They also adapted the MBW curriculum for TV broadcast. During COVID-19, they developed a library of educational content for national educational TV programming across the three countries of implementation. Some projects also helped governments develop content for their TV programmes, and they helped raise awareness at the community level and ensured girls were encouraged watch the programmes.

The IE project distributed assistive devices such as: Orbit Readers (for note-taking in Braille) for visually impaired learners; laptops with assistive Clicker 8 (a multisensory tool for dyslexic learners) and Dolphin Supernova (screen magnification and Braille support) software packages. This was accompanied by training for teachers and other stakeholders on the devices and software.

There were other ways that projects used technology which were not as directly related to learning outcomes. For example, projects used technology to enhance their monitoring and evaluations approaches and for effective data management. iMlango use electronic smart cards for digital attendance monitoring and WWW used tablets for monitoring attendance. Technology was also used for awareness raising and for reaching out to caregivers. For example, MGCubed used radio for their back-to-school campaigns.

CASE STUDY: iMlango, Kenya: Computer labs and digital portal learning in schools

The iMlango project was a technology-driven project, delivered by a consortium of partners, led by global satellite operator Avanti Communications, alongside sQuid (the digital transactions and eLearning solutions provider), WhizzEducation (a simulated maths tutoring provider) and Camara Education (a provider of hardware). Before COVID-19, high-speed satellite broadband connectivity and IT resources, including school computer labs and projectors were set up in schools. Digital learning content was delivered through the iMlango digital portal, including individualised simulated maths tutoring and whole-class maths content (via Maths Whizz), alongside digital learning content for literacy and life skills (via Longhorn).

CASE STUDY: MGCubed, Ghana: Broadcasting from studios in Accra to schools

Before COVID-19, the MGCubed project provided solar-powered and satellite-enabled distance learning infrastructure (projector, modem, computer and solar charger) to schools, and broadcast learning content and lessons from studios in Accra which were conducted by Master Teachers. This enabled teachers in schools or teacher trainers to deliver interactive learning sessions to students, teachers, communities and government officials. During COVID-19 the project leveraged the project infrastructure and expertise to create content for the government's Ghana Learning TV programme. The project also distributed hardware such as TVs and decoders as needed.

CASE STUDY: GEARR project, Uganda: Using mobile technology for remote needs assessment during COVID-19

Before COVID-19, most parents or caregivers of GEARR project girls made school fee payments by mobile money. In the wake of COVID-19, the project requested use of these phone numbers to maintain contact with project girls, to assess girls' learning needs and progress, as well as to gather information about the issues and challenges the girls faced in their daily lives. The project conducted three phone surveys with girls throughout 2020. Collected data was used to inform the academic and psycho-social support offered to girls by the teachers responsible for maintaining weekly phone calls with them. The project also piloted a maths learning assessment approach over the phone via SMS.

What did the EdTech interventions achieve?

In the table below, the headline outcomes for the six researched projects are provided from Midline and Endline Evaluations, to give an indication of the impact that each project had overall. This outcomes data relates to the impact of projects as a whole however, including both technology-based and non-technology-based components. They are primarily focused on learning and transition. It is also important to note that, due to COVID-19, most projects were unable to carry out their Endline Evaluations as planned, and there is therefore a lack of standardised learning assessment data that speaks to overall learning outcomes. In addition, the table details the value for money (VfM) rating for the project's EdTech components as determined by Shah and Sidhu's recent analysis of the value for money of EdTech across the GEC.[10,11]

The table focuses on the six projects that were part of the in-depth research project and it should be noted that these projects were chosen because of their positive outcomes. The study follows a 'positive deviance' approach to sampling by exploring how specific GEC programmes have managed to overcome complex problems inherent to administering EdTech interventions for marginalised girls, in order to produce successful outcomes. Therefore, it is important to acknowledging the overall ineffectiveness of many EdTech interventions across the GEC, particularly during the COVID-19 pandemic that will not have been included in this research.

The six projects generally demonstrated, to different extents and using a range of metrics, some positive associations between EdTech components, learning and/or transitions for marginalised girls, and value for money. The cross-project findings on implementation in the next section focuses on the factors of success, i.e., the 'how and why', behind the relative successes of these EdTech-supported projects.

"The six projects generally demonstrated, to different extents and using a range of metrics, some positive associations between EdTech components, learning and/or transitions for marginalised girls, and value for money."

Name of the project	Headline outcomes and VfM rating
Discovery Project	Outcomes: There were large positive impacts on girls' learning found via learning assessments in Nigeria and Wajir (Kenya) at midline. There was no learning assessment data available at endline, but teachers reported improved performance and learning for girls. Internal monitoring also showed significant learning gains post-midline in Ghana and Nigeria (not measured in Kenya). There was evidence that Girls' Clubs and MBW supported positive change in self-efficacy and life skills at endline. VfM rating: **Good VfM** – driven by the project's reach and impact during COVID-19
GEARR	Outcomes: Learning assessment data at midline was not relevant to present study. No learning assessment or exam data was available at endline but self-reported improvements in learning linked to radio (for girls), SMS (for boys and girls) and telephone calls (for boys). VfM rating: **Promising VfM** – Low cost-per-beneficiary ratios for EdTech components but limited by lack of learning assessment data to understand impact.
IE	Outcomes: Girls with disabilities improved their literacy and numeracy scores between midline and endline, and students maintained learning improvements throughout the COVID-19 period. At midline, there was a statistically significant association between experiencing a successful transition and not having a disability, but by endline this was no longer the case, and both groups transitioned at similar rates. VfM rating: **Promising VfM** – the provision of assistive devices was found to be cost effective relative to specialist schools and Orbit readers provided value for money relative to other devices performing a similar function.
iMlango	Outcomes: The Endline Evaluation found that the original project activities led to improved learning outcomes, though COVID-19 school closures were a significant hindering factor and led to learning losses. Learning assessment data was not available at midline or endline. There was self-reported evidence of learning gains in literacy and numeracy at endline, although national exam (KCPE) results showed significant variation across the four counties. VfM rating: **Promising VfM** – poor VfM in its current iteration due to high cost-per-beneficiary driven by internet connection and maintenance, licenses for content, and field staff, but a new model is anticipated which lowers costs substantially.
MGCubed	Outcomes: Statistically significant increase in learning outcomes through learning assessments at midline. At endline, exam data showed statistically significant improvements for girls in both maths and English. Statistically significant improvement in transition rates at endline. VfM rating: **Good VfM** – relatively high costs offset by project reach (more than 3 million children across Ghana) and impact during COVID-19.
WWW	Outcomes: Endline findings are not yet available. COVID-19 adaptations were found to have been effective by a Rapid Assessment Study commissioned by the project. Girls' skills in numeracy and literacy performance scores showed no loss of learning in numeracy and minimal loss in literacy. VfM rating: **Promising VfM** in relation to COVID-19 adaptations, driven by low cost-per-beneficiary of radio component, although data linking radio with outcomes is mixed.

[10] Shah, V. and Sidhu, S. (2023) What drives value for money in technology-enabled activities of Girls' Education Challenge projects? GEC Spotlight Brief #5, February 2023

[11] N.B. Cost-effectiveness is addressed in the GEC portfolio via a primarily qualitative comparison of the relative value for money of the different types of interventions by Shah and Sidhu (2023). This assessment considers cost as it relates to FCDO spending, and reflects an explicit emphasis on contextualised, rather than comparable costs and outcomes.

Factors for success

This section outlines the factors of success that contributed to the effective implementation of EdTech across the sampled projects. Factors are organised and presented by themes and sub-themes that emerged from the research:

- Evidence-informed design and delivery
- Building and maintaining relationships across and between stakeholders
- Comprehensive and continuous training and capacity development
- Decentring technology to optimise implementation for marginalised girls.

All of these elements, though potentially relevant to education programmes more broadly, contain specific learning related to the effective implementation of EdTech for marginalised girls within marginalised communities.

Evidence-informed design and delivery

1. Consulting the community and the girls, and centring their views and needs.

Ensuring communities and girls voices were centred involved taking a contextual, community-informed approach to evidence building. Having a detailed needs analysis that reached the most marginalised girls was key. This was highlighted through projects' approaches to hardware distribution during COVID-19 school closures. MGCubed, IE and WWW all referred to using data in order to appropriately target limited resources for hardware distribution to the most marginalised learners during COVID-19. For example, MGCubed carried out a mapping exercise to determine which students within their cohort did not have access to TVs or decoders within their households and targeted the provision of this hardware, prioritising children with disabilities, students at risk of dropping out.

2. Assessment of existing infrastructure, capacity and context.

Reliable infrastructure is a facilitating factor and unreliable a hindering factor. Unreliable electricity and internet, lack of equipment, resources and general school infrastructure proved to be a major challenge for many projects. There was a strong need across projects to clearly understand the infrastructural context in which they were operating, and to plan EdTech interventions accordingly. This included mapping existing infrastructure within schools, exploring government plans for device and infrastructure provision, and gathering data on the physical infrastructure of schools (for example, whether schools had the classroom space for computer labs). It was also important to foreground sustainability and equity considerations into assessments of which technological devices would be most contextually appropriate. EdTech interventions should be designed with the specific aim of reaching the most marginalised learners. Projects also highlighted the importance of assessing school leadership and teacher leadership and capacity to take on EdTech interventions in their schools.

What does not work

Opting for a high-tech option where the infrastructure is not available. During COVID-19, one project opted for an app solution but there was low uptake because of the low access to smartphones. The project has since reflected that a more in-depth analysis of access to technology was needed and that a low-tech avenue would have been more appropriate.

© Discovery Learning Alliance

CASE STUDY: Discovery Project, Ghana, Kenya and Nigeria: Human-centred content design

The Discovery Project engaged in what they described as 'human-centred content design' for their *My Better World* video series. This approach involved gathering young people together to feed into the initial story design and using challenges they were facing in their own lives as a basis of the story content. They also asked young people, as well as gender and education experts, to review the scripts once they were developed, as well as the rough cut animatics. One project staff member felt that this was one of the key reasons why the popularity and uptake of the *My Better World* series far surpassed expectations. Another explained how the project invested time in getting an idea of training needs by engaging in deep discussion with teachers and other stakeholders.

3. Feeding organisational knowledge into the design and drawing from existing evidence.

It was important that organisations' prior experience and expertise fed into the design and implementation of EdTech components. Discovery Project staff explained that their extensive experience of using educational media as a tool for classroom learning over many years in LMICs had been crucial when designing their GEC programme. It is also important to draw from existing external evidence.

CASE STUDY: GEARR – drawing from existing evidence to inform their design

The use of existing external evidence and lessons in the development of GEARR's COVID-19 response was considered crucial. Project staff emphasised the way in which the choice of EdTech components, and how they were implemented, was based on a range of evidence, such as rapid reviews on distance learning for at-risk groups, the 2014-16 Ebola outbreak in West Africa and evidence on out-of-school approaches to learning. Constantly reviewing literature and evidence as it was emerging during COVID-19 implementation was also an important component of GEARR's evidence-based approach. Alongside this was more informal information-gathering, including speaking to other organisations about their plans and sharing content. One GEARR staff member also described using established evidence about best practice in the design of radio lesson content.

4. Strong, multi-layered monitoring and evaluation (M&E) that drives adaptations.

Having strong ongoing M&E processes was critical to effective implementation, both during normal programming and during the COVID-19 school closures. Monitoring methods and tools varied across projects, with some use of more innovative, technology-enabled monitoring, alongside other, more conventional forms of M&E. M&E practices included: regular assessments and follow-up visits by local staff to observe implementation and gather feedback from schools, and in some cases to assess the condition of technological devices; monitoring of EdTech-supported teaching and lesson observations by project staff and government staff; opportunities for teachers to provide feedback through teacher cluster meetings; and regular face-to-face check-ins with headteachers. Indeed, one WWW project staff member emphasised that it was the multi-level nature of their monitoring that made it so effective.

Along with the adaptation of project activities during COVID-19, projects also had to pivot their M&E processes, adopting new, remote tools for data collection in response to school closures. GEARR staff highlighted that it was critical to invest in monitoring during COVID-19, to both gather data on activities that were new and untested, and to ensure that the most marginalised students remained on the project's radar. The use of phone-based monitoring was most common across projects.

Within EdTech interventions that are new or innovative, having the scope for productive, iterative adaptations was key to improving implementation throughout the project cycle. The ability to make adaptations based on flexibility and real-time monitoring and the intentional embedding of iterative, agile approaches to implementation is a key factor of success.

"Adaptations to the project have been built in through the intentional use of continuous data and knowledge of the context with project managers specifically tasked with coordinating and circulating the data and contextual insight within teams to inform changes. Interviewees were unable to point towards one significant adaptation, but rather: 'a series of incremental adaptations whose cumulative impact has been enormous'." (iMlango Midline Report).

The importance of piloting

GEARR made use of a piloting approach to gather data on untested modalities for learning during COVID-19. They piloted an SMS learning tool, with learning assessments conducted via phone pre- and post-implementation in order to assess the effectiveness of the tool before rolling it out to the broader cohort. In this instance, the learning outcomes suggested that the tool's effectiveness was limited, and based on this data the decision was made to discontinue the SMS intervention and refocus efforts on other modalities.

Building and maintaining relationships across and between stakeholders

1. Engaging with government at all levels for impact and sustainability.

Systematic efforts to engage government at different levels was another crucial factor of success. Face-to-face engagement with government stakeholders was critical for buy-in at the district and national levels. Strong relationships with government were important to maximise the impact and sustainability of the projects.

CASE STUDY: Discovery Project: Working with the government to ensure sustainability

The Discovery Project developed a close working relationship with the Nigerian government, which led to shared sustainability planning and the take-over of the project's Accelerated Learning Programme activity by the State Universal Basic Education Board. The particular importance of working closely with the Ministry of Education at the local level was highlighted in the Discovery Project Completion Report: strong relationships at the local level were reported to *"cultivate ownership, ensure coordinated and collaborative implementation, and increase prospects for long-term sustainability."* For the Discovery Project, this was achieved through regular meetings with district teams to report on progress, work through challenges, and agree on plans going forward, as well as participation in project training, monitoring and support to schools.

CASE STUDY: MGCubed: Integrating gender equality and social inclusion (GESI) approaches

MGCubed's experience during COVID-19 demonstrates how strong relationships between GESI-focused projects like MGCubed and national governments can enhance the potential for EdTech to boost systemic inclusivity. One GEC staff member highlighted how MGCubed's policy of incorporating sign language interpretation within their TV shows during COVID-19 has been adopted and taken forward by the government's distance learning agency who now always make sure to include sign language interpretation to their video content.

"Under-resourced and pressurised education departments can sometimes end up with a 'what works for most' mentality, rather than looking at what works for the most marginalised children…This is where projects like the GEC helping those policy makers assess and analyse how they can develop policy or strategy that would allow everyone – including children such as girls from pastoralist families, or girls with disabilities – to benefit from the EdTech solutions they're considering." (GEC staff member).

2. Community engagement in EdTech implementation.

Community engagement is an important aspect of EdTech programming and buy-in and ownership of community members is critical for success. Families and communities should be engaged and informed about each aspect of the intervention and the technology could be used for other things in the community. Project staff referred to activities geared towards building relationships with other local stakeholders as important, such as repeated face-to-face engagement with school leadership, staff, parent-teacher associations (PTAs) and broader community members as part of project preparation.[12] One Discovery Project staff member also emphasised the benefits of entering communities with *"a listening ear and immense degree of humility"*, and building relationships on that basis. Expanding community access to the project technology also helped with community ownership and buy-in.

CASE STUDY: Discovery Project: Expanding community access to project technology

Discovery Project staff highlighted the value of allowing for broader community use of technological devices to increase community buy-in to EdTech projects. In their most rural implementing location (Wajir county), where communities may have had no prior access to TV, they decided to make schools 'centres for community viewing' of TV programmes: *"It brought the school together, it unified it, and made schools think of creative ways of protecting the equipment, owning the projects and ensuring that the project is sustained... Creating that acceptance level and excitement and allowing community access to use the resource beyond the classroom."* (Discovery Project staff member).

3. The importance of human relationships to support learning.

Interpersonal relationships were crucial to supporting learning within EdTech programmes. Nowhere was this better evidenced than during COVID-19, which exposed the limits of independent, tech-supported study. Having strong pre-existing relationships between stakeholders across different levels and harnessing those relationships to drive the COVID-19 response was a common theme across project interviews. For example, at the community level, restrictions on movement during COVID-19 meant that community embeddedness and strong relationships with community-based stakeholders were vital for continued student engagement.

Research conducted on GEARR's COVID-19 response, as well as project interviews, highlighted the importance of both caregivers' involvement and human interaction in supporting students' learning, *"to reassure students, check on their wellbeing and listen to their concerns"*.[13] Research conducted on the efficacy of WWW's COVID-19 response also confirms the importance of peer relationships in driving learning during COVID-19. Research found that radio lessons were not associated with higher performance in reading and mathematics, except where girls listened to the radio in groups.[14] Engaging parents and caregivers was an important aspect of programming especially during COVID-19 as they were generally the gatekeeper to devices such as radios or phones. Establishing and maintaining relationships with caregivers, as well as students, was a key learning to come out of COVID-19. Speaking with and raising awareness amongst caregivers regarding the need to support their children's education during the school closures was key.

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[12] N.B. Some of this relationship-building took place during the first phase of the projects, GEC-1.

[13] Damani, K., Daltry, R., Jordan, K., Hills, L., & Evans, L. (2021). EdTech for Ugandan girls: Affordances of different technologies for girls' secondary education during the Covid-19 pandemic. Development Policy Review.

[14] Amenya, D., Fitzpatrick, R., Njeri Mvungu, E., Naylor, R., Page, E., and Riggall, A. (2021) The Power of Girls Reading Camps: Exploring the impact of radio lessons, peer learning and targeted paper-based resources on girls' remote learning in Kenya. [Working Paper 32]. EdTech Hub

Comprehensive and continuous training and capacity development

1. Training multiple stakeholders.

School actors were identified as having a strong influence on project engagement and project staff highlighted the importance of projects being backed by supportive head teachers. This is closely linked to one of the key implementation components: the importance of engagement with, and training of, a variety of stakeholders, including other school actors, including and beyond teaching staff. While the most common references related to training teachers, many interviewees also noted the importance of providing training to other stakeholders. This included head teachers, community members, government officials, project staff and trainers themselves.

2. Training as an ongoing process, not a one-off activity.

In order to lead to meaningful and effective EdTech adoption, training should not be delivered as a one-off exercise. Rather, initial input needs to be followed up by a series of follow-up activities. Project staff cited various activities that they considered to be effective ways of consolidating knowledge. One IE staff member noted that teachers who had been trained in using Braille-reading devices responded well to opportunities to immediately apply their learning with their students *"while their learning was still new"*. Project staff also noted the significant value in providing space for teachers to access training materials after training and to ask follow-up questions. The importance of virtual peer support groups (via WhatsApp) was also highlighted, which enabled teachers to receive support that was relevant to their experience and confidence levels. Those struggling with an aspect of technology adoption could appeal to more confident tech-users within the network to have their particular problem addressed. These examples also demonstrate the value of delivering EdTech training in a blended format.

The benefits of blended training

MGCubed project staff noted the benefit of combining face-to-face initial training with virtual follow-ups. While initial in-person training was important for relationship-building and ensuring teacher buy-in, regular online follow-up training opportunities then enabled teachers to engage in remote peer learning, which was less structured and based on individual teachers' needs.

3. Making training interactive, adaptive and differentiated.

Evidence gathered from projects indicated that training teachers to integrate EdTech into their practice may be most effective when it is adaptive and individualised to teachers' needs. IE staff members placed particular emphasis on the need to respond to teachers' knowledge gaps as training progressed. Both in relation to head teachers and class teachers, enthusiasm for EdTech implementation often correlated with teachers' digital literacy and confidence with technology, which in turn was often related to their age. Older teachers were sometimes less likely to be interested, perhaps due to being less familiar and less confident with technology in general, while younger teachers *"were more open to technology and understood the importance of it – it made all the difference."* (iMlango project staff member). In a similar vein, an IE project staff member also noted that successful implementation of EdTech *"really depended on how comfortable the teacher was with the Orbits."* This key external factor underscores the importance of individualised training that appropriately supports teachers relative to their level of ability.

Modelling emerged as a particularly successful way of transferring EdTech knowledge and skills to teachers and other project stakeholders. Project staff noted that it was especially important for teachers to be able to watch others demonstrating how to use the EdTech before trying it themselves.

4. Focusing on other training needs alongside training on EdTech integration.

While many interviewees focused their comments on efforts to improve teachers' digital literacy and confidence, several also noted the importance of addressing other training needs in parallel with EdTech-specific training. Given the GEC's focus on inclusion, GESI training was unsurprisingly a core training component and crucial for ensuring equitable access to EdTech. For iMlango, GESI training had a direct impact on student access to EdTech; as one staff member explained, *"to start with, boys would push to the front [in ICT classes], so [the GESI trainer] taught the teachers to line students up to keep things fair."* A Discovery Project staff member noted that providing GESI training to facilitators of the *My Better World* video content was found to be important. When girls watched videos on child marriage or sexual and reproductive health, facilitators needed to be prepared to answer questions and carefully guide discussions. It also emerged that a lack of subject knowledge was preventing teachers from successfully using EdTech in their classrooms in some cases in the iMlango project.

What does not work

Training teachers on EdTech technology and pedagogy without assessing and addressing other relevant teacher professional needs is not as effective as combining EdTech training with other aspects of professional development as needed. For example, training teachers on technology that supports numeracy may not be effective if they don't have strong Maths subject knowledge and related teaching strategies.

5. Providing specific guidance in crisis situations.

EdTech training took alternative forms when the COVID-19 pandemic forced schools to close and, in many cases, changed the nature of stakeholder involvement. Project staff, volunteers and teachers were suddenly called upon to monitor remote learning and, in the case of teachers, produce large amounts of asynchronous content in place of their habitual live teaching. Therefore, it was important for EdTech training to focus on enabling stakeholders to conduct these specific activities. GEARR and MGCubed provided teachers with guidance on how to conduct telephone conversations with students, including how to get students to recall prior learning and how to record the conversation effectively for reporting purposes. They trained stakeholders to be thorough in their approach to follow-up phone calls and not just accepting it if someone said the girl was not there: protocols were extremely important. Significant effort was also made to train teachers to deliver radio (GEARR) and TV (MGCubed) lessons. Projects focused on technical areas such as 'how to speak to a camera' gave teachers opportunities to rehearse as the lessons were being developed. In parallel, studio engineers received training in how to develop asynchronous content, having been "initially only trained to run live lessons... Developing video is different, so we gave them training on editing videos." (MGCubed project staff member).

The importance of situating EdTech within a broader holistic model

1. Blending technology-based and non-technology-based options.

A key learning across GEC projects was the importance of multi-pronged approaches that included low or non-tech options given issues with accessibility to technology. The principle of ensuring maximum inclusivity often led projects to offer non-technology-based options alongside the tech-based ones. As one WWW project staff member stated, *"The question of equity needs to be at the centre of the design. It needs to be a solution that doesn't cut off those who cannot afford or would struggle with digital literacy."* GEARR staff reflected that this approach was central to the success of their COVID-19 response, resulting in 95% of their students being able to access at least one form of support during that period:

"Those four things [radio, SMS, telephone calls, printed learning packs] meant we had multiple channels to reach our children. We knew that not all kids have phones, not all our kids have access to a radio, or can go pick up a learning pack. But if you have these four channels then we could split our resources across." (GEARR staff member).

Blending technology-based tools with other tools for learning was also found to carry significant benefits for learning outcomes. GEARR research found that when the paper-based learning packs were included, these packs were more 'impactful' on girls' education than all forms of EdTech.[15] WWW also found that paper-based learning resources were strongly associated with higher learning outcomes, especially for girls attending camps.[16] Similarly, WWW staff members noted that blending technological elements with non-technology-based tools allowed for the benefits of both components to be maximised. While radio by itself was not considered successful, combining radio broadcasts with paper tutorials and consistent feedback from teachers unlocked the learning potential of the radio medium.

2. Designing inclusive, contextualised EdTech content within a holistic model.

To ensure that EdTech did not exacerbate education inequalities, gender-sensitive, inclusive and contextually-appropriate content design was essential. GEARR project staff cited examples of how they had designed radio show content to be inclusive and relevant to their marginalised female students during COVID-19. They challenged gender stereotypes by featuring girls in a variety of stereotypically male professions within radio programming and made girls' after-school aspirations a broadcast focus. Similarly, the Discovery Project subtitled video content and reviewed all content using Wizenoze software to check that it was suitable for students with low literacy levels. They also put significant resources into designing video content around the lived experiences of their future viewers, engaging in discussions with stakeholders to ensure that the characters reflected their realities and cultural norms, *"down to the clothing of characters"*.

3. Aligning with existing national education plans and curricula.

Prioritising alignment with existing education sector plans was identified as an important way to ensure that EdTech was relevant to the context, supported by stakeholders, and therefore sustainable. It was also important that EdTech content was curriculum-aligned. Designing a COVID-19 response that made use of, aligned with, or complemented government-provided distance learning was important. Where governments had applicable and relevant distance learning offerings for the project cohort, these were integrated into the design of projects' COVID-19 responses. Where there were gaps in government provision – such as the lack of secondary level radio lessons in Uganda – projects developed their own content to fill these gaps for their students. And where projects were already providing scalable distance learning as part of their projects, this was fully integrated into the national response (for example in the Discovery Project and MGCubed projects).

[15] Damani, K., Daltry, R., Jordan, K., Hills, L., & Evans, L. (2021). EdTech for Ugandan girls: Affordances of different technologies for girls' secondary education during the Covid-19 pandemic. Development Policy Review.

[16] Amenya, D., Fitzpatrick, R., Njeri Mvungu, E., Naylor, R., Page, E., and Riggall, A. (2021) The Power of Girls Reading Camps: Exploring the impact of radio lessons, peer learning and targeted paper-based resources on girls' remote learning in Kenya. [Working Paper 32]. EdTech Hub

Recommendations

Evidence-informed design and delivery

- Ensure that the views of girls and communities are at the centre of programme design and that the needs of the most marginalised girls are continually assessed. These needs should inform on-going adaptations of interventions. This is particularly important to ensure the most marginalised have equal access to EdTech modalities.
- Ensure that a thorough assessment of existing technological infrastructure is conducted and includes the capacity of schools, headteachers, teachers and other school staff to take on, and take ownership, of EdTech programmes. The type of technology used should depend on the most marginalised learners' ability to access and use it. EdTech interventions should be designed with the specific aim of reaching the most marginalised learners.
- EdTech interventions should be evidence-based and evidence generating, with monitoring data informing adaptive design. The programme design should be informed by existing literature and previous experience and expertise of programme partners on what worked or did not work. Programmes should be adaptive, with regular monitoring and evaluations informing design decisions and adaptions as needed. Monitoring should include the views and experience of the end-users.

Building and maintaining relationships across and between stakeholders

- Ensure a holistic approach and a 'human' element to supporting learners – technology cannot replace face-to-face teaching and learning. Interpersonal relationships are the backbone of teaching and learning and technology cannot replace in-person learning but should rather be a tool to complement and enhance the work of teachers.
- Engage with government partners at all levels from the outset. Systematic engagement with government helps to ensure buy-in at different levels which helps maximise the effectiveness of the programme. This engagement is also critical if EdTech interventions are to be sustained beyond the lifetime of one project.
- Engage communities and extend the use of technology to other community activites. A key lesson from the GEC is that community ownerships and engagement with EdTech approaches is critical for its success and for its sustainability.

Comprehensive and continuous training and capacity development

- Build the capacity of teachers and other relevant stakeholders. The 2023 Global Monitoring Report found that teachers often feel unprepared and lack confidence teaching with technology. Their capacity needs to be built and so does that of other key stakeholders such as headteacher, community members, government officials, project staff and trainers themselves.
- The training of teachers should be continuous rather than one-off with blended approaches considered, as relevant. Training should meet the needs of the teachers and be based on their experience with technology. Other aspects of professional development such as GESI and subject knowledge should also be integrated into teacher professional development plans, if needed.
- Build the capacity of teachers and project staff, and provide clear guidance, in crisis situations. The COVID-19 crisis illustrated the need for nimble and flexible programming as EdTech interventions and to quickly adapt. Teachers, community volunteers and project staff need support and guidance during crisis situations to ensure adapted activities are effective.

De-centring technology to optimise implementation for marginalised girls.

- Consider blended technology-based and non-technology options, particularly in low resource settings. EdTech modalities should reach the most marginalised learners and approaches must consider limitations in the infrastructure and the existing skills base in schools. Evidence from the GEC has highlighted that in some contexts paper-technology options combined with technology options are often the most effective.
- EdTech interventions need to be gender sensitive and inclusive. One of the tools that GEC projects used to ensure GESI considerations were taught through is the GESI Framework and Guidance. This was used with projects to help them think through each intervention through a GESI lens.
- Align with existing national education plans and curricula. As already outlined, projects should work closely with government partners from the outset to maximise impact and help ensure sustainability. EdTech options should align with sector plans and government partners should be heavily involved in curricula and content development.

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Girls' Education Challenge

UKaid from the British people

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