

Education technology: road-map for impact in school-based programmes in low resource environments

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1. Introduction

1.1. Purpose of the document

This is an external resource available for all those working in the sector. It is intended as a set of principles for how to undertake effective ICT for education interventions, particularly when implementing in formal school settings within low resource environments.

1.2. Structure of the document

The document begins with brief explanation regarding how it should be used. It then summarises the two studies that informed the learning for the road-map. It then concentrates on three areas of good practice: design of the programme, people in the programme, and broader programme effectiveness. The document closes with ten questions for programmes to reflect on in order to promote good practice.

1.3. Appropriate usage and explanation

Each programme using ICT in education will have different conditions, requirements, and constraints. It is not advisable to be prescriptive or advocate for a standardised approach to implementation in all contexts. However, it is helpful to reflect on experiences and build a resource of good practices that can contribute to the wider sector. The intention is that this document acts as a guide for decision makers of all types when considering how to use ICT in education in low-resource environments. It is in no way comprehensive and does not necessarily engage with the issues that will be most pertinent in all contexts. The road-map for impact is grounded in the lessons learned from the implementation of the C4C education programmes and associated evaluations in Zambia and Ghana. It therefore inevitably draws on the particular issues encountered in those two school-based programmes. As a result, the principles highlighted are more applicable for school-based programmes than for the many other contexts outside the school environment in which technology can also be used to instigate positive change. Similarly, the principles are primarily applicable for low-resource environments with little previous exposure to technology: alternative guidance is likely to be more applicable in mid or high-resource environments. To understand the full context, the document should be read in conjunction with the full case studies of the programmes in Zambia and Ghana.

2. Context

2.1. Overview

The foundation for the road-map for impact is the research conducted in completion of two evaluative case studies in Ghana and Zambia. Throughout the evaluations the research team recorded programme specific issues but also reflected on the broader implications and lessons that contribute to this 'road map for impact'.

2.2. Ghana case study

The partnership uses the expertise and experience of Savana Signatures (www.savsign.org), supported by IICD and Edukans, to build the capacity of participating schools in the effective use of ICT, as part of the wider Connect4Change (C4C) programme (www.connect4change.nl). The five core schools supported by Savana Signatures as part of the programme are Darul Hardis, Yilonayili, Yong Dakpemyili, Yoo Roman Catholic, and Pong Tamale Experimental. In 2012 the program started with five schools and in 2014 the program was extended to five additional schools. Savana Signatures has scaled the programme to a further 13 schools across Tamale, Savelugu and Ho (through funding from C4C and other partners). Each participating school has been provided with the following:

- A computer lab with 11 computers
- A printer
- A camera
- Two projectors
- 1 laptop
- A desktop computer for the head teacher for data collection and management
- Training and support from the programme coordinators (capacity development on basic ICT, ICT pedagogy, and basic hardware maintenance)
- Various additional support, training, workshops, hardware and offline educational software
- Mentorship through the programme
- Knowledge sharing events (workshops and competitions)

The primary research for the case study was undertaken during two field visits to Tamale, the first in September 2013 and the second in May 2015. Research activities completed include: 13 school visits, 65 interviews with teachers, 13 interviews with school leaders, 8 additional interviews, 3 lesson observations, and assessments of school records.

2.3. Zambia case study

The 'Mpelembe basic schools partnership' is an initiative supported by IICD and Edukans that uses the expertise and resources of Mpelembe School (www.mpelembesec.com) in Zambia to build the capacity of the partner schools in the effective use of ICT as part of the wider Connect4Change (C4C) programme. The Mpelembe basic schools partnership includes the following schools: Mpelembe, Rokana, Riverain, Matete, Kamfinsa and Parklands. All of the schools are in or near to Kitwe, in the Copperbelt region of Zambia. The partnership is led by Mpelembe, a well-respected, well-resourced secondary school in Kitwe. IICD has played a central role in establishing and building the partnership and has provided each participating school with the following:

- a computer lab with 10 computers,
- a computer for the head teacher,
- training and support from the programme coordinators,

- Various additional support including training, workshops, hardware and educational software.

The primary research for the case study was conducted during two field visits, the first in November 2013 and the second in March 2015. Research activities completed include: 10 school visits, 56 interviews with teachers, 10 interviews with school leaders, 21 additional interviews, 4 lesson observations, and assessments of school records.

3. Good practice: design of the programme

Principles to consider regarding programme design stage:

- Prioritise needs assessment
- Structure partnerships effectively
- Prioritise access for the most marginalised
- Clarify the Theory of Change at the outset
- Ensure comprehensive budget setting
- Adopt realistic expectations of impact

3.1. Prioritise needs assessment

An ICT for education programme is more likely to succeed if it makes significant investment at the outset in understanding the priority needs of the context within which it will be operating. This requires spending time talking in detail with a wide range of students, teachers, principals, ministry officials and other educational stakeholders prior to deployment in order to understand the perspectives of different stakeholders regarding the priority educational needs and most effective means by which to engage with them. This also provides opportunity to understand the expectations, needs, fears and aspirations surrounding the programme. It is particularly important to ensure that there is a realistic understanding of the level and speed of change that will be realistic to anticipate through the introduction of technology into a school environment. Integrating this into programme design increases the chance that the implementation will be focused on the most important areas. It is easy to assume that the most appropriate approach is self-evident: the long history of inappropriate programmes demonstrate that this is not the case. What worked effectively in one context will not necessarily work elsewhere.

3.2. Structure partnerships effectively

Effective programme design requires clear mutual understanding between all organisational stakeholders regarding the scope and scale of a programme, and how these fit within the broader needs of the beneficiary environment. It is vital that all partners have a clear understanding of their roles and their responsibilities, and the boundaries for each of these. Any partnership is as strong as the weakest link and it is necessary to invest the time and energy, particularly at the outset, in cultivating effective working relationships. It is particularly important to plan in advance how the partnership will continue to thrive once one of the key stakeholders (such as a head

teacher within a school-based partnership) is transferred to another position. All of these things are particularly pertinent for ICT for education programmes as they often involve partnerships between organisations from different sectors, each coming with their own expertise, assumptions, vocabularies and values.

3.3. Prioritise access for the most marginalised

The majority of ICT for education programmes are not naturally structured towards the concerns of the most marginalised children. It is vital to consider from the design phase onwards how the most marginalised children within a community will be able to benefit from the programme. The nature of the most marginalised will vary according to the context, but often an appropriate focus is on girls and children with disabilities. Each aspect of the programme should be reviewed to ensure it is structured in a way that provides maximum opportunity for the most marginalised to benefit.

3.4. Clarify the Theory of Change at the outset

Programmes introducing technology into education systems often have significant initial focus on the inputs: the hardware and software that will be introduced. While a vital decision, this should be undertaken in combination with a focus on the outputs and on the outcomes: what will happen as a result of the inputs. Constructing a thorough Theory of Change (www.theoryofchange.org) at the outset can help ensure that the programme has clarity regarding objectives, boundaries, and outcomes – and the link between each. In addition it can provide a tool for assessing the strength of each link in the theory, to determine how possible it is for the anticipated change to take place.

3.5. Ensure comprehensive budget setting

When technology is introduced into an education context it is common for the budget to be overly focused on the introduction of the technology, and not on the follow-up activities that are vital if the technology is to be useful for education. Considering total cost of ownership is a first step towards sensible budgeting. Many programmes fail to live up to initial expectations because they have not been designed in a way that makes affordable the on-going costs of connectivity, electricity, and upgrading of hardware and software. Adequate finances should also be allocated to training budgets: on-going, tailored, in-depth, in-school support in addition to training conducted during the initial implementation.

3.6. Adopt realistic expectations of impact

Many ICT for education programmes are explicit about the way in which they will facilitate substantive pedagogical change, without designing the programme activities in a way that make this a realistic aspiration. Many low-resource education environments are somewhat conservative in nature; significant time and on-going training is normally required in order to facilitate a systemic change in the way education takes place. Programmes should be designed in a way that accommodates this. In addition, it is necessary to be realistic regarding what is inside and outside the control of the programme. A well designed and well implemented programme may not achieve the anticipated impacts as a result of multiple external factors beyond the control of the

programme. This should be accounted for when setting expectations and conducting a risk assessment is often an effective means by which to ensure this takes place.

4. Good practice: people in the programme

Principles to consider regarding people within the programme:

- Central role of committed school leadership
- On-going motivation for teachers
- Detailed, on-going, school-based training for teachers
- Talented and experienced in-country personnel

4.1. Central role of committed school leadership

The presence of committed and talented school leadership is vital within an ICT for education programme. Without strong commitment from the school leaders the introduction of technology into the school environment will have limited effectiveness, regardless of the quality of the hardware and software and the commitment from teachers. When a school leader prioritises an ICT-related change programme in an on-going manner then it is more likely to be effective across the school. The school leadership can lead by example, motivate teachers and help create a culture that is receptive to change. Even if the programme is primarily focused on teachers, principals should also receive devices and training to ensure that none of the activities are perceived as undermining their authority.

4.2. On-going motivation for teachers

If teacher motivation to engage in the programme can be maintained beyond the initial enthusiasm then there is much greater chance of the programme being sustainable in the long term. It is often assumed that all teachers will be positive about the introduction of an ICT-related change programme. This is not always the case and significant resistance may be encountered. Often teachers recognise the potential of the technology but are faced with the reality of being over-burdened and under-resourced and so struggle to sustain new approaches. Other teachers are understandably afraid of the unknown and reluctant to invest time in learning new skills that are deemed to be irrelevant or too difficult to master. It is important that programmes are aware of this throughout, recognise the validity of the concerns, and design the programme approach accordingly. In addition, it is necessary to consider all involved teachers within a school, rather than just assuming that those who are vocal and enthusiastic regarding ICT are representative of the whole.

4.3. Detailed, on-going, school-based training for teachers

Training teachers in the use of ICT is an on-going process that requires sustained inputs. This is particularly important in low-resource contexts with little prior exposure to technology, challenging infrastructural constraints, and a wider conservative education system. It normally takes longer than anticipated for teachers to become confident independent users of technology

within their classroom. This can lead to frustration and feelings of abandonment, as expectations around improved performance are not met. Popular cascade approaches to teacher training (where one group is trained and then that group trains other trainers) are difficult to sustain in practice and unlikely to be effective without significant support, quality control, and incentives for on-going engagement. Effective training is tailored for the context, on-going throughout the programme, situated in-school, and appropriate for the varying confidence levels of each participating teacher. In addition, it is necessary to consider which additional stakeholders within the school environment will need to participate in training in order for the technology to be effectively embedded. This is likely to involve ensuring that training is also made available to school administrators and support staff (in addition to head teachers, as addressed in section 4.1).

4.4. Talented and experienced in-country personnel

The effective implementation of an ICT for education programme requires significant input of on-going support from a range of specialists. It is not sufficient to have experienced personnel deploying the technology, conducting initial trainings, and then leaving. Regular school monitoring visits from experienced personnel who are respected and trusted by school leaders can have a significant positive impact on programme adoption. Many ICT for education programmes withdraw this external support too quickly, and under-estimate the positive motivational benefits of regular visits.

5. Good practice: broader programme effectiveness

Principles to consider regarding broader programme effectiveness:

- Effective integration with the wider education system
- Building on early positive impact
- Prioritising sustainability and exit strategy
- Centralising learning throughout
- Anticipating and embracing evaluation

5.1. Effective integration with the wider education system.

In order to operate effectively for the long term an ICT for education programme needs to function in a way that integrates programme activities with the priorities of the curriculum, the approach to assessment, and the broader system of education governance. This requires a detailed plan for how each of these elements will be addressed, alongside on-going attention throughout the programme lifecycle. Effective integration with the curriculum and assessment frameworks is dependent on developing appropriate content: ensuring that the materials available through the technology match that which the teachers are required to teach. Building trust and rapport with the relevant ministry may require a significant input of time but it is a vital process for ensuring long term programme acceptance and viability.

5.2. Building on early positive impact

The introduction of ICTs into schools often leads to a steep initial increase in enthusiasm from teachers, school leaders, children, parents and wider community members. Particularly in rural environments with very low previous exposure to ICT, school leaders often report that student attendance levels increase significantly following the introduction of the technology. This is often due to a local perception that technology represents progress, and its introduction provides the school with an increased standing and reputation within the community. At its most positive, basic inputs of technology can have a strong immediate impact on a school. The pertinent challenge for effective programming is to proactively build on the initial enthusiasm (through appropriate on-going training) so that the positive change is sustained for the long term and does not gradually disappear.

5.3. Prioritising sustainability and exit strategy

Before technology is introduced into a school, it is necessary to consider how the potential positive impacts will be sustained beyond the lifecycle of the programme. Many programmes that have introduced ICT into schools in low resource environments have not considered this adequately, resulting in computer labs that become un-used once the initial enthusiasm for the programme has subsided. Schools regularly report that they are unable to pay the monthly costs of connectivity and electricity required to make maximum use of the technology provided to the school. Programmes need to factor this on-going cost into overall programme costs otherwise schools are likely to miss out on the most transformative potential benefits of the programme. Future sustainability is enhanced by investing resources in preparing for it from the outset. This can involve training programmes to help schools develop revenue streams through the technology, and holding skills workshops to help schools apply for future funding. From the programme side, it can involve designing long term interventions and providing clarity from the outset regarding the length of anticipated funding.

5.4. Centralise learning throughout

The use of technology in education is a rapidly developing field, with a necessary focus on learning and improvement. Evaluative practices should inform implementation rather than simply operating as end-of-programme accountability tools. ICT for education programmes work most effectively where there is a systematic approach to integrating learning throughout in order to improve and refine practice. Again, this requires appropriate methodological approaches to track learning, and a programme culture which is receptive to feedback and iterative change processes.

5.5. Anticipating and embracing evaluation

Alongside continuous learning, there is an important role for periodic assessment of progress through external evaluation exercises. Programme implementation can be undertaken in a manner that facilitates effective future evaluation. This involves planning in advance the priority areas for assessment, the most appropriate approach to sampling, the best way to engage with the multiple variables affecting an ICT for education programme, and the most applicable indicators of change that need to be tracked. Conducting a baseline study to ascertain the pre-

implementation situation lays a valuable foundation to enable future robust evidence building. It is important to invest in this at the outset, often in the midst of multiple conflicting priorities, in order that the full benefits of evaluation can be realised in future years.

6. Questions for programme reflection

The following ten questions can be used as a tool to facilitate reflection and effective decision making for programmes and organisations implementing (or considering implementing) an ICT for education intervention in a low resource environment.

Questions to consider	Why it matters
Is the programme applicable for the context or imported as a package from elsewhere?	What works in one location will not necessarily be effective somewhere else – programmes should start with a thorough needs assessment.
Does the programme centralise the importance of teachers and equip them to drive it forwards?	For an ICT for education programme to be effective in the long term it requires sustained, motivated engagement from teachers – this requires sustained, in-school training and support.
Is the programme designed to ensure school leaders are involved, motivated and incentivised to continue participating?	Long term integration of ICT into a school is dependent on the understanding and motivation of school leaders.
Is the programme fully integrated with the broader education system and the national curriculum?	ICT for education programmes should not exist in a silo – content provided should match the national curriculum and contribute to national education agendas.
Is the programme's pace of anticipated change realistic in the context?	It takes a long time to instigate a substantial shift in education through ICT, especially in low resource environments with previously limited access to technology.
Does the programme have a robust plan for sustainability of the intervention after the funding cycle finishes?	Promising initiatives often fail to consider the on-going costs (such as electricity, connectivity, mobile phone bills) of an intervention and where the money will come from for each of them.

<p>Is the programme working to integrate the ICT effectively into the pre-existing educational context?</p>	<p>It is much easier to simply introduce ICT than it is to successfully integrate it within well-established education routines and traditions.</p>
<p>Is the programme driven by demand of the users?</p>	<p>Many programmes are launched with assumptions regarding what the demand is within the user community, leading to disillusionment and often failure.</p>
<p>Is the programme structured and implemented in a way that utilises the strengths of different sectors?</p>	<p>Cross-sector partnerships require significant on-going work in order to operate effectively and add value to an intervention.</p>
<p>Is the programme assessing its effectiveness through appropriate monitoring and evaluation?</p>	<p>All ICT for education programmes should be seeking to add to the learning and evidence regarding what constitutes good practice.</p>