

Critical approaches and varied impacts: Understanding the role of educational technology in disadvantaged schools

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Abstract

This paper will investigate a critical approach to using technology for educational development in disadvantaged regions in Cape Town, South Africa. The case study employed for this analysis is officially known as MELISSA: measuring e-learning impact in South African disadvantaged areas. MELISSA is a three-year (2009 – 2011) research partnership between the University of Cape Town and Cape Peninsula University of Technology in South Africa, and Università della Svizzera italiana in Switzerland. As the acronym indicates, MELISSA evaluates ICT impact on teachers working in poor schools in the Western Cape of South Africa. Core to the MELISSA framework is the design and implementation of teacher-support systems in ICT use. This is structured as a three-tiered e-learning curriculum, training teachers on various aspects, including basic computer literacy, the general use of ICTs in education, and adapting pedagogy to take advantage of ICT-related opportunities.

The research has thus far monitored changes in the development of basic skills to the eventual adoption of ICTs in the classroom. Educational challenges that arise in this environment are isolated and examined, if and when they occur. This may include socio-cultural, political, economic, and natural factors that may impact on the teaching environment. MELISSA furthermore evaluates the impact of ICTs through an encompassing framework, considering: changes in educators' understandings of the (digital) technologies they use, changes in educators' understandings of their professional teaching activities, and changes in educators' understandings of being strong leaders in their professional and social activities.

A total of six disadvantaged primary schools in Cape Town partake in the MELISSA curriculum: Rosmead Central (Lower Claremont), Zimasa (Langa), Moshesh (Langa), Vukukhanye (Gugulethu), Blossom Street (Athlone), and Them bani (Langa). Each school is situated in a relatively poor or informal region, housing communities that live on the periphery of formal education and employment. Although schools have limited resources, they are all participants in the Khanya initiative, thus receiving fully kitted computer laboratories. Khanya has deployed ICT facilities – labs, whiteboards, servers – in close to 1500 schools across the Western Cape. It has been a remarkably successful initiative, and continues widespread distribution on the back of a large-scale economic recession.

In light of the above, this paper intends to describe MELISSA as a critical approach that employs technology for (formal) educational development. There are many challenges and opportunities associated with this approach, and they will be evaluated as becomes necessary. There are also many lessons and insights to be drawn from such an extensive research action. They will be presented accordingly, in line with a theoretical perspective and rich methodological framework. It is hoped that this paper will inform a broader acknowledgement of the role of personal and professional adoption of ICTs in the 'under-resourced' educational environment.

Introduction

This paper will investigate a critical approach to using technology for educational development in disadvantaged regions in Cape Town, South Africa. The case study employed for this analysis is officially known as MELISSA: Measuring E-Learning Impact in primary Schools in South African disadvantaged Areas. MELISSA is a three-year (2009 – 2011) research partnership between the University of Cape Town and Cape Peninsula University of Technology in South Africa, and INSTITUTION. As the acronym indicates, MELISSA evaluates ICT impact on teachers working in poor schools in the Western Cape of South Africa. Core to the MELISSA framework is the design and implementation of teacher-support systems in ICT use. This is structured as a three-tiered e-learning curriculum, training teachers on various aspects, including basic computer literacy, the general use of ICTs in education, and adapting pedagogy to take advantage of ICT-related opportunities.

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The aim of the training was to look at digital technologies in a threefold manner:

- as a subject of study (digital literacy)
- as an educational strategy to deliver some teacher training modules, to provide teachers with a direct experience of eLearning
- as an educational tool to be integrated – in a sustainable way – in the classes, to bridge the digital divide, and to equip learners to become active players in the knowledge society, hence improving their future employability level

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Objectives

This paper has an ambitious overall goal: to make community informatics and ICT4D practitioners and researchers discuss in a more open and serious manner about difficulties they encounter in their project design and development and on how they were able to overcome (or not) them. The belief of the authors is that a more sincere discussion not focusing only on great case studies and exceptional and anecdotal examples can help this research field to faster mature and consequently have a wider positive impact on the individuals, practitioners and researchers are trying to support with their actions. This paper therefore wants to set the way, being an example of how it is possible to critically look at one's own project, not only highlighting what went as expected, but also focusing on challenges and difficulties (which cannot always be overcome) and the lesson learnt from those.

In the paper the MELISSA project is critically evaluated, through an ethnographic approach, criticalities faced by the three main stakeholders of the project:

- Primary school teachers involved in the project
- Institutions hosting the training part of the MELISSA project
- The research team, composed of two units, one based in South Africa and one based in Switzerland

Methodology

In this section we want to present both the methodology applied in the MELISSA project and the methodology used to inform this paper.

Let us start describing MELISSA methodology, which consists of a blended approach mixing quantitative and qualitative methods. In particular, the quantitative investigation aims at studying the impact that becoming more skilled in mastering technologies has on the self-perception of being a good teacher, and is informed by the Self-Efficacy construct (Bandura, 1995). Bandura's Self-Efficacy has been declined in the project into Computer Self-Efficacy and Teacher Self-Efficacy; the former representing "an individual perception of his or her ability to use computers in the accomplishment of a task" (Compeau & Higgins, 1995), whilst the latter defined as the "judgment of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated" (Bandura, 1995). The part on Computer Self-Efficacy is based on the questionnaire proposed by Compeau and Higgins (1995), measuring the level of confidence of the respondent in using a piece of software in a given educational context with a Likert scale. For Teacher Self-Efficacy, the Teacher's Sense of Efficacy Scale proposed by Tschannen-Moran and Wolfolk Hoy (2001) has been adopted. This scale takes into consideration three areas of the teaching

activity: “student engagement”, “instructional strategies” and “classroom management”. Teachers were required to answer these questions by indicating how much they would feel able to accomplish given teaching activities. The questionnaire was provided to respondents four times, at the beginning, in the middle, at the end, and 6 months after the end of the course (follow-up) for the first group of teachers attending the training; whilst the second group was measured at the beginning and at the end of the training.. The qualitative investigation in MELISSA incorporated semi-structured interviews and (participant) observation components. These are some of the foundational elements to qualitative approaches (Babbie & Mouton, 2004; Bernard, 2002; Madden, 2010). Interviewees out of both control and experimental groups were selected, which represented a 25% sample of more than 140 teachers. The control group consisted of teachers that have not yet undergone MELISSA training, opposed to the experimental group that has undergone three modules (a full semester) of training. Respondents were probed on their attitudes toward using ICT in their professional environments. Moreover, respondents were queried around their social representations and perceptions of ICTs, also relating to those of their colleagues, students, student parents, and the school management body (Rega & Van Zyl, 2011). Additionally, the research team also conducted in-field observations, somewhat resembling the anthropological method of participant observation (see Bernard, 1998). This method concerns the partaking of the researcher in the daily activities and routines of study subjects. Although the team were not closely involved in these behaviours, they did record their observations during the training sessions – in which they essentially participated as instructors and mentors. These observations serve to augment the qualitative data set.

This paper does not in particular focus on the results and discussion of the quantitative and qualitative analysis of the MELISSA project, but aims at describing the output of a (self-) participant observation the researchers performed on their-selves, their team, and the overall project, in order to highlight difficulties encountered during the development of the MELISSA project. The participant observation is being organized along three main clusters: considerations about teachers involved in the project, observations about the schools involved in the training; and (self-) observations on the MELISSA team (in South Africa and in Switzerland). Through this self-critical reflection the researchers hope to demonstrate how, in order to advance in this research field, the academic community should give more space to critically evaluate development project, learning from mistakes and challenges.

Context

In 2004, the South African Department of Education (DoE) identified information and communication technologies (ICTs) as integral to transforming teaching and learning (DoE, 2004). This has led to an interest in distance education and technological learning in the national B.Ed. degree programme, as part of The National Policy Framework for Teacher Education and Development. Moreover, the DoE has since aspired to introduce ICT facilities within under-resourced schools, despite mainly stipulated by a draft national policy (see DoE, 2004; 2006). The motivations for this are cited as an increase in information use and analysis for both teachers and learners, and the enhancement of schools’ administrative capacities (DoE, 2004:6). The White Paper on e-Education outlines the DoE’s primary intentions, but these are most evident in a provincial intervention in the Western Cape, named the Khanya Project.

The Khanya project

In 2001, the Khanya project launched as a Western Cape provincial initiative to provide ICT infrastructure to every school in the province. The ambitious goal of the project was described as:

By the start of the 2012 academic year, every educator in every school of the Western Cape will be empowered to use appropriate and available technology to deliver curriculum to each and every learner in the Western Cape. (Khanya, 2011)

Four key 'business drivers' supported this process: a shortage of teaching capacity, a need for coordination efforts (NGOs, the business sector, government, and the like), bridging the digital divide, and preparing the Western Cape for the Knowledge Economy of the 21st Century (ibid.). Khanya has to date provided technical infrastructure – mostly in the form of computer laboratories with audio-visual support- to more than 1300 schools, with only around 133 remaining to implement. It can likely be predicted that the project would reach its goals (Chigona et al., forthcoming). Notwithstanding the noble intentions of Khanya, there has been some evidence of its failure to align with successful teaching and learning practices (Davids 2009; Chigona, Chigona, & Davids, 2010). Some of the primary challenges include high student:computer ratio, under-maintenance and high repair costs, limited training follow-up, limited technical support, and the incapacity of educators in using provided technologies and softwares.

Measuring e-learning impact

The issue of ICT adoption has been highlighted by the introduction of Khanya labs into fairly unknown territory. The associated challenges appear to be not only related to infrastructure, but also to socio-economic and political dynamics. Low technical skill levels, coupled with lacking content management skills and a weaker understanding of pedagogical issues, may contribute to diminished ICT adoption in schools (Chigona et al., forthcoming, Drent & Meelissen, 2008). Furthermore, as described by Davids (2009), there was a feeling extant among teachers that the present national curriculum never mandated the use of ICT for classroom delivery. This subsequent perception was that ICTs could not have been overly important for the DoE. This situation does not bode well for the goal of preparing the Western Cape for the so-called Knowledge Economy, fully equipped with 21st Century skills.

It is within this context that the value of perception and impact measurement comes to the fore. The infrastructural aspect of ICTs is rather evident: limited technical provision necessarily means limited adoption. However, the many other impact-related questions still had to be addressed: for example, what do teachers think about technology? Do they use technology? If they do, how, if they do not, why not? How do they perceive the influence that ICTs are having on their teaching practice? Through its blended approach, the MELISSA project has attempted to examine these concerns more closely, particularly on the back of a (reasonably successful) Khanya directive. MELISSA was structured as a three-year action research programme, first intent on delivering teacher training (in ICT), then to measure the impact of this (both quantitatively and qualitatively), then to disseminate the results as broadly as possible. The training curriculum, to be delivered to over 100 teachers in under-resourced Western Cape schools, was composed of three modules: digital literacy (basic software skills), ICTs in pedagogy (demonstrating the many uses of ICTs in the classroom), and teaching and learning the knowledge society (a general understanding of education's role in the 21st Century).

To demonstrate the impact of ICT training, MELISSA divided its group of respondents into two groups: Group A (also called Experimental) and Group B (also called Control). The former was composed of 42 teachers, working in two disadvantaged primary schools in Cape Town, the majority (85%) of which are women. The primary age group of teachers here is between 31 and 40 years, most indicating a college certificate as their

highest educational level. The average teaching experience for this group was 18 years. Group B consisted of 68 teachers from four disadvantaged primary schools, of which 72% of them are women (again, the majority). The age group here is between 41 and 50 years, with most having a college certificate as highest educational attainment. The average teaching experience here was 16 years. Both groups would be involved in the project, at least to some extent, for a full three-year period. However, as will be discussed below, the project continues to face many challenges and uphill battles in its goal of delivering and measuring the impact of teacher training. An overview of the particular data findings of the project are not the aim of this paper, but rather, an informative discussion on some of the key lessons to be taken from the MELISSA experience.

General observations

The MELISSA Project, as stated, was designed as an action-research initiative that aimed to train educators on ICTs and to measure the impact of this both quantitatively and qualitatively. The project is drawing to a close – notwithstanding the possibility of a continuation/expansion – and it has become necessary to examine it more critically. This may be achieved by evaluating those opportunities and challenges that contributed (to various degrees) to the overall execution and functioning of the project. From these, in turn, may be drawn certain lessons and insights for future direction. The respective data *findings* (e.g. quantitative self-efficacy measurements) of the project are not discussed, henceforth, as the paper seeks to achieve a meta evaluation of its overall effectiveness. Opportunities and challenges take root in three interdependent and fluctuating ‘action groups’: educators, institutions, and the research team. Each of these groups exhibited varying opportunities, to which the research action responded (at least, theoretically). However, opportunities were merged in complex socio-economic, political, and institutional dynamics, presenting many challenges in implementing the action research programme. We shall now turn to a discussion of these findings as per each action (or, stakeholder) group.

Educators

For all educators initially presented with the MELISSA proposal, the opportunity seemed universally clear. If they were to join the training programme, they could learn about the exciting world of information and communication technology. Moreover, not only could they develop critical skills in ICTs, they would gain knowledge in *utilising* these skills in the classroom. Above and beyond, this opportunity was what they – and the research team – would bank as the motivating factor in taking part as ‘project participants’. Certainly, the primary or mutual opportunity was met with various subsets of individual opportunities; teachers could enhance their *own* skills, thus contributing to their personal – as different from professional – development. They would, for example, learn how to send emails to their friends, or to upload and edit pictures from their digital cameras. The opportunity offered by MELISSA would help them become not only effective teachers in the knowledge society, but also confident users of information technology at home and in the community. Participating educators had the additional opportunity of becoming self-reflective practitioners (see Yoo, 2011). This would imply that, once exposed to digital literacy modules, teachers would be able to evaluate how they make sense of their profession in the context of the information society. This was also the cornerstone of the MELISSA ambition: to monitor the increase or decrease of both teacher- and computer self-efficacy over the course of a three-year period. Ultimately, by taking part in the (weekly) sessions,

teachers would work in a collaborative lab environment, enabling them to push the limits of their own perceived capacities. Whether or not MELISSA participants were *fully informed* of this opportunity has since become a fundamental question. From the onset, however, it seemed the overarching opportunity was clear, as indicated by this teacher, “I always maintain that technology...it’s power to me, really, because I can do such a lot with it.”

In participating in the MELISSA programme, educators were exposed to a number of challenges as well. First off, it would appear that at some schools, participants were confused as to exactly what they would be learning (even after they have attended the module for a few weeks). There seemed to be no universal grasping of the intentions or goals of the project. This concern originated in the project execution itself, and seeded a lack of interest and motivation among teachers to truly embrace the learning modules. As the modules progressed, some participants became increasingly disinterested and the rate of involvement dwindled. It was not immediately clear what exactly gave rise to the growing indifference among respondents, certainly causing much frustration amid both educators and MELISSA team members. Conversely, this was not the case at all schools. For example, at Blossom Street Primary, educators seemed to be overly enthusiastic and attended each session in full. However, this was and remains to be a great concern for the project as a whole – the authors will return to this matter in the Discussion section. Noteworthy for now, however, is that teachers were explicitly informed of project goals at the start of the second training module.

The second primary challenge – both for the team and for participants themselves – was the technical skillset or literacy of participants. Indeed, most educators took part *because of* their own lack of skills or training. Additionally, many of them appeared to be ‘digital immigrants’ and did not possess the confidence in engaging fruitfully with ICT (Author 1 & Author 2, 2011). This was further exacerbated by the fact that educators did not have the possibility of practice at home, given that they did not possess personal computers. Lacking or diminished skillsets certainly hampered educators from participating with ease, and the training sessions slowed down considerably. Even though MELISSA set out to tackle (and measure) exactly this ‘weakened efficacy’, it was never entirely prepared to this – sometimes overwhelming – extent.

Institutions

School institutions, and perhaps the local Department of Education, were also subject to the potential benefits of the MELISSA endeavour. A decade ago, a local government ICT initiative, the Khanya project, had the objective of equipping every school in the Western Cape province with technology labs (including audio-visual tools) to support and improve teaching and learning (Chigona et al., forthcoming; Khanya, 2008). Yet, anecdotal and scholarly evidence suggests that the integration of the provided Khanya technology has been challenging, if not ineffective (Chigona et al., 2002, 2010, forthcoming; Davids, 2009). Additional training that could capitalise on the potential failures of ICT integration would always become an opportunity for participating schools. In this regard, the Khanya laboratories provided the perfect infrastructure in which departmental teachers could further their skills, notably to adopt within the classroom environment. School management circles were eager to be involved, as MELISSA offered the chance to “empower” their staff. This, in turn, presented an opportunity as institution, to become active participants in the knowledge society – a competitive advantage in relation to some of the poorer schools in the region.

As the MELISSA training modules progressed, most participating institutions also encountered a number of challenges. Failing infrastructure seemed to be the inherent obstacle from the very outset. Despite Khanya

providing a decent basis from which to kick-start ICT engagement, computer laboratories were not fully functioning as illustrated by this teacher, “Computers are so sensitive, so they break easily. Sometimes as a school we do not have enough funds to repair and maintain them”. Technical and mechanical issues were certainly evident in most of the 6 participating schools, the more frustrating of which was the lack of sufficient internet bandwidth. Other issues included broken air-conditioning systems, a limited number of chairs, desks and computers, vandalism in and around the labs, user restrictions, little to no audio-visual support, and time limitations.

Furthermore, institutions were also subjected to a number of internal and external pressures. Internally, teachers had numerous other commitments (both personal and professional), often at the expense of training sessions. Externally, school operations were severely disrupted by nationwide teacher strikes and the advent of the Soccer World Cup 2010. These issues certainly did not bode well for the facilitation of an ICT4Education initiative, as was apparent in the dynamics of the research team.

Internal team

The Swiss team that initially developed the MELISSA proposal had the intention of building on the successes of an ICT4Education project in Brazil, running from 2005 to 2008. The team decided to expand the research action – dubbed Brazilian eLearning Teacher Training in K-12 (BET K-12) – to understand if self-efficacy was a construct that could explain changes in teachers’ attitudes toward technologies. Moreover, the team wished to evaluate if ICT-based courses could recognisably affect teachers’ perceptions of being good or better educators (Fanni et al., 2010). To achieve this, the focus shifted to South Africa, an emerging context that had similarities to that of Brazil. Here, there was an opportunity for North-South collaboration, and the Swiss team wanted to build on their relationships with future project partners, the University of Cape Town and the Cape Peninsula University of Technology. The prospect of international collaboration was certainly lucrative and a number of potential doctoral candidates and project assistants were assembled. Within the scope of a few months, the newly formed international team was ready to investigate the impact of ICTs on the teaching practice.

This grand opportunity of action/interventionist research notwithstanding, team members experienced their share of uphill battles. The first and foremost challenge was to gain commitment and buy-in for the project, both from educators/institutions and the team itself. In terms of educators, it has become increasingly clear that the project goals and intentions were never delivered or explained in full (despite several attempts!). The reasons for this are yet to be examined, but the eventual (indirect) outcome was a somewhat demotivated training audience. This factor could be rooted within unbalanced team dynamics, which will be discussed in more detail below. For now, it may be safe to assume that there were disparate agendas within the team setup throughout the duration of the project. That is, each member had differing roles, not necessarily unified or balanced with the rest of the team. This was exacerbated – or even partly caused – by weak internal communication and a high staff turnover later on. Let us now examine these factors in more detail.

Discussion

After a period of three years, the MELISSA project is now nearing completion. It has been a critical approach – at least in theory – to ICT for development in South African schools. To date, many important lessons may be extracted from the project’s numerous activities, both internal and external. Even though MELISSA

achieved the tough feat of conducting action research in under-resourced schooling communities, it has been barred by significant and provoking complexities. These may again be attributed to groups of educators, their broader institutions, and the internal research team. Each of these groups constitutes an active stakeholder in the project as a whole, albeit with different levels of commitment (and influence!). Although all three stakeholder groups are mutually dependent, each is characterised by individual roles, behaviours, and responsibilities. We have thus far described the foremost challenges and opportunities for each group – let us now attempt to contextualise these findings in terms of a critical approach to using technology for development.

The role of educational technology in the South African classroom has become a serious concern, not least in disadvantaged schools (see Chigona et al., forthcoming). The local Western Cape government initiated the first steps toward integrating technology in schools by launching Khanya. Although Khanya has its shortcomings, its philosophy seemed to be that infrastructure would always be the prerequisite to using ICTs in the educational environment. Unfortunately, infrastructural provisions would not quite solve the issue of sustainable use and adoption. This was the very foundation MELISSA could build on by providing, and then measuring, digital literacy training for educators. Educators would then, ideally, be exposed to non-threatening and encouraging activities that would inspire use and perhaps even innovation. MELISSA would open up the tools and opportunities for them to utilise information technologies, both personally and professionally. It was up to teachers to decide how they would use or embrace this knowledge.

Institutionally, the goals of teaching and learning could be reached through the use of ICTs. However, there appears to be no (clear) strategic direction for this. Management circles – at least among the MELISSA schools – are unfamiliar with specialised approaches that make full educational use of Khanya facilities. These dynamics may be framed in technological determinism, specifically in what Bates (2000:18) titles the ‘technological imperative’: we have to use technology because of a blind belief that it is good for us. Barker (2010:x) also uses the term ‘instrumental attitudes’ to describe the view that technology is useful and relevant for “passively facilitating the intentions of human actions”. This perception seems to accord with much of our qualitative data, as illustrated here: “The technology, I think, is the future because everybody should be computer literate...not only in the classroom but in the world – global – we need to be computer literate. Everything you use – it’s technology.”

Although one cannot read too much into the above quotation, it is but a small indication of a surprisingly dominant attitude among MELISSA teachers and school institutions. Perceptions of instrumentalism are rife and they may lead to fascinating outcomes for the project as a whole. However, despite such overly deterministic attitudes, MELISSA still faces a number of critical shortfalls. It has already been indicated that educators have lost motivation, as management has lost patience, in the gradual development of the project. Although the overarching goals were noble, and encouraged self-reflection in a digital age, this never seemed to manifest in sustainable adoption or innovative use. A fairly unexpected result, one the team always wanted to avoid, was the loss of hope, and the rise of discouragement. While the importance of teacher training on ICT is acknowledged, this project did not have the sufficient buy-in from all involved: teachers, school management, and even MELISSA team members. Moreover, the training modules were voluntary (for the most part), opposed to compulsory teaching commitments. The challenge would always be to present training modules in accordance with teacher schedules.

From a meta observational perspective, certain internal and external forces were not conducive to the successful execution of MELISSA. It was in fact tough to work in under-resourced areas, where infrastructure was always unstable, and social conditions marked by crime, unemployment, and poverty. Some team members expressed fear and hesitation in working in informal areas, and this was an example of a social dynamic hardly foreseen by the project management. From pure in-field observation, it was surmised that team members appeared to lose their 'research hats', and become almost *too* involved in the intervention. Subsequently, these members lost focus as to the common project goals, insisting that the proposed research has become somewhat of an inconvenience, not only to them, but also to the participants. Respective quantitative and qualitative research measurements suffered as a result, as there were unequal commitments from MELISSA colleagues. 'Emic' perspectives (see Shenton, 2010) were contributing to ruptures within the team. This was – and continues to be – evident in weak internal communication, and an imbalance between project management, fieldworkers, and seemingly external project collaborators. The imbalance was furthered by a high staff turnover, particularly among incoming/outgoing PhD students. Internally, it would seem there is a certain 'transaction cost' (to borrow from the theory of strategic management) present between team members (see Hill & Jones, 2009). This scenario is marked by the transference of valuable and necessary information to other members. Transactions of this kind have the intention of reducing confusion among the team and of promoting shared (research) knowledge – a professional community of practice, if you will (see McComas, Fry, Frank, & Fraley, 2010). However, in certain cases the transaction costs were too high for respective team members: information may be exchanged and research findings shared, but nothing would be gained in return. Whilst one member 'pays' for updating others, he/she is not 'paid' for the exchange, and nor is he/she reimbursed in the future. The transaction cost model is one possible means to frame the various imbalances in the MELISSA team. Given a dynamic of unequal in- and output, team members may become disenfranchised – their critical roles weakened.

Concluding thoughts

The MELISSA project latched on to the opportunity of researching the impact of ICT adoption in teaching practice. In the framework of action research, the team set out to develop teacher training modules and to evaluate how these influenced personal and professional notions of efficacy. This has spawned much interest among participating institutions, with management circles delighted at the possibility of internal skills development. As the training progressed, however, the project was experiencing increasing difficulties, both in terms of its research methodology, and its internal team organisation. From a methodological perspective, it would appear that conditions (institutional, social, economic, and political) were not fully conducive for successful execution. This included an array of factors, notably under-resourced school environments, institutional restrictions (e.g. the research was not to impede any educational commitments), trying social circumstances, and lacking economic input (e.g. high) maintenance costs. Conversely, the research methodology did not always compensate as necessary, and relied on favourable conditions (this point will be explored in future papers). In terms of internal organisation, it would appear that members were not equally participative, where individual agendas superseded those of the team. Buy-in from all team members was not fully attained, and the project lacked sufficient ownership. This was evidenced in weak communication input, and high transactional costs.

Ultimately, whilst it is recognised that MELISSA is not yet completed, it may gain much insight from an internal evaluation of its successes and failures, specifically the latter. An introspection of failure is critical in identifying those challenges to be addressed by future ICT4D endeavours. It is an acknowledgement of the team's misconceptions, overstated expectations, and research biases. As a critical approach to using and evaluating technology for development, the project has much to learn. This approach's weakness was identified as the inability to adapt (sufficiently) to strenuous local conditions. It may be characterised as too much of a top-down approach, as opposed to more collaborative inquiry (which would have the educators as co-creators of training modules). The more top-down approach was despite the research design being conceived alongside the South African team, with the teachers properly informed of project goals during the second training module.

Nonetheless, these factors have manifested as divisive issues among team members, where there is an imbalance of participation. In the context of critical ICT4D approaches, it has become imperative to re-evaluate the project in terms of its overarching goals, its methodological execution, and its team interplay. A renegotiation of project values may serve to improve not only the research capacity, but also the respective project outcomes. Ultimately, this paper is an attempt to highlight some of the foremost difficulties experienced in community informatics/ICT4D projects, notably to learn from these. Introspection of failure is seemingly not given enough impetus in projects of this nature; it is our very intention to emphasise given challenges as valuable learning experiences.

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