

**Designing and implementing an
Information Communication Technology for
Rural Education Development (ICT4RED) initiative
in a resource constrained environment:
Cofimvaba school district, Eastern Cape,
South Africa**



ICT4RED



TECH4RED
ENHANCING EDUCATION

Marlien Herselman and Adele Botha
2014



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First published in December 2014

First Print December 2014

Design done by: Go Fish Designs



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Herselman, M. and Botha, A. (2014). *Designing and implementing an Information Communication Technology for Rural Education Development (ICT4RED) initiative in a resource constrained environment: Cofimvaba school district, Eastern Cape Province, South Africa*, 1 ed. 2014, CSIR Meraka: Pretoria, South Africa.

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ISBN: 978-0-7988-5618-8 (hbk) | ISBN: 978-0-7988-5619-5 (ebk)

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Designing and implementing an Information Communication Technology for Rural Education Development (ICT4RED) initiative in a resource constrained environment: Cofimvaba school district, Eastern Cape, South Africa

This book is a representation of the activities, which were recognised as essential components to consider, when implementing a certain ICT4D initiative in a resource constraint area in the poorest province of South Africa which is faced with significant educational challenges. This initiative was coined the ICT4RED initiative and was a research, development, innovation and implementation project that changed the way in which teachers teach with technology in their specific context over a period of 3 years (2012-2015).

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Herselman, M. & Botha, A. (2014). *Designing and implementing an Information Communication Technology for Rural Education Development (ICT4RED) initiative in a resource constrained environment: Cofimvaba school district, Eastern Cape, South Africa*. Pretoria, South Africa: CSIR Meraka.

ISBN: 978-0-7988-5618-8 (hbk)

ISBN: 978-0-7988-5619-5 (ebk)

We would like to thank Estee Wiese (estee.wiese@gmail.com) for her editorial support during preparation of this book.

Contents

| | | |
|------------|--|-----|
| Section 1. | Designing and implementing an ICT4RED initiative | 1 |
| 1.1 | Introduction | 1 |
| 1.2 | Background to the ICT4RED initiative..... | 3 |
| 1.3 | Implementation principles | 11 |
| 1.4 | Scope of the ICT4RED initiative | 12 |
| 1.5 | The design (methodology) and implementation (phases) of the ICT4RED initiative | 13 |
| 1.6 | Evolution of the ICT4RED phases..... | 27 |
| 1.7 | Conclusion..... | 65 |
| 1.8 | References | 65 |
| Section 2. | ICT4RED Implementation Framework..... | 70 |
| 2.1 | Introduction | 70 |
| 2.2 | ICT4RED initiative principles and ethos..... | 71 |
| 2.3 | Initiative Management..... | 75 |
| 2.4 | Implementation processes | 76 |
| 2.5 | Final ICT4RED Implementation Framework..... | 76 |
| 2.7 | Conclusion..... | 81 |
| 2.8 | References | 81 |
| Section 3. | Teacher Professional Development | 83 |
| 3.1 | Introduction | 83 |
| 3.2 | Methodology used | 83 |
| 3.3 | Phase 0..... | 85 |
| 3.4 | Phase 1..... | 93 |
| 3.5 | Phase 2..... | 93 |
| 3.6 | Phase 3..... | 109 |
| 3.7 | Phase 4: Reflections, Transfer and Transform | 118 |
| 3.8 | Conclusion..... | 122 |
| 3.9 | References | 123 |
| Section 4. | Monitoring and Evaluation | 128 |
| 4.1 | Introduction | 128 |
| 4.2 | The importance of Monitoring and Evaluation of Information and Communication Technology for Education (ICT4E) Initiatives..... | 128 |
| 4.3 | How the monitoring and evaluation of ICT4RED was approached..... | 130 |
| 4.4 | How the Monitoring and Evaluation Framework was Developed | 131 |
| 4.5 | An Overview of the ICT4RED Monitoring and Evaluation Framework..... | 134 |
| 4.6 | Choosing Evaluation Focus Areas and Evaluation Questions..... | 137 |
| 4.7 | Considering the Monitoring and Evaluation Framework in terms of the NEPF and OECD DAC Criteria..... | 140 |
| 4.8 | Choosing appropriate Evaluation Methods for each of the Evaluation Questions. | 142 |
| 4.9 | How the Evaluation Methods were Designed, Tested and Implemented | 145 |
| 4.10 | How ethical clearance and provincial approval for the initiative was obtained..... | 163 |

| | | |
|------------|--|-----|
| 4.11 | Implementing the Monitoring and Evaluation Framework – Some Lessons | 164 |
| 4.12 | References | 166 |
| Section 5. | Managing ICT Deployment in Schools | 168 |
| 5.1 | Initiative Management | 168 |
| 5.2 | Operations Management | 171 |
| 5.3 | Summary | 200 |
| 5.4 | References | 201 |
| Section 6. | Change management | 202 |
| 6.1 | Changing a community | 202 |
| 6.2 | Changing the principals | 206 |
| 6.3 | Summary | 212 |
| 6.4 | References | 213 |
| Section 7. | Sustainability and Value through Improved Decision-making | 215 |
| 7.1 | Introduction | 215 |
| 7.2 | Sustainability and value in ICT4D initiatives | 216 |
| 7.3 | A decision-making view on sustainability | 219 |
| 7.4 | Understanding costs: Total Cost of Ownership model | 231 |
| 7.5 | Selecting technology for sustainability: multi-criteria technology selection model | 238 |
| 7.6 | Enabling Sustainability through Improved Decision Making | 242 |
| 7.7 | Summary | 245 |
| 7.8 | References | 247 |
| Section 8. | The use of social media in the management of an ICT for Education initiative. | 249 |
| 8.1 | Introduction | 249 |
| 8.2 | Literature Review | 250 |
| 8.3 | Methodology | 253 |
| 8.4 | Data Analysis | 262 |
| 8.5 | Findings | 272 |
| 8.6 | Conclusions and recommendations | 274 |
| 8.7 | References | 275 |
| Section 9. | Synthesis of the ICT4RED initiative | 279 |
| 9.1 | Introduction | 279 |
| 9.2 | Addressing the aim and objectives | 279 |
| 9.3 | What were the biggest success factors? | 282 |
| 9.4 | Other significant results | 284 |
| 9.5 | Challenges | 286 |
| 9.6 | Recommendations for further implementations | 287 |
| 9.7 | Recommendations relating to sustainability and policy | 289 |
| 9.8 | Evaluation | 294 |
| 9.9 | Summary | 298 |
| 9.10 | References: | 298 |

Acronyms

| | |
|----------|--|
| CAPS | Curriculum Assessment Policy Statements |
| DBE | South African Department of Basic Education |
| DRDLR | South African Department of Rural Development and Land Reform |
| DSR | Design Science Research |
| DST | South African Department of Science and Technology |
| EAYL | Earn as You Learn |
| ECDoE | Eastern Cape Department of Education |
| ICT4D | Information and Communication Technology for Development |
| ICT4RED | Information and Communication Technology for Rural Education Development |
| ICTE | Information and Communication Technology in Education |
| IS | Information Systems |
| IT | Information Technology |
| LTSM | Learner Teacher Support Material |
| M&E | Monitoring and Evaluation |
| MoA | Memorandum of Agreement |
| MoU | Memorandum of Understanding |
| NDP | National Development Plan |
| NEIMS | National Education Infrastructure Management System |
| NGO | Non-Governmental Organisation |
| SGB | School Governing Body |
| SMT | School Management Team |
| Tech4RED | Technology for Rural Education Development |
| TPACK | Technological Pedagogical Content Knowledge |
| TPD | Teacher Professional Development |

Executive summary

This book is a representation of the activities, which were recognised as essential components to be considered, when implementing a certain ICT4D initiative in a resource constrained area in the poorest province of South Africa which is faced with significant educational challenges. This intervention was coined the ICT4RED initiative and was a research, development and implementation project that changed the way in which teachers teach with technology in their specific context over a period of 3 years (2012-2015).

The book aims to provide an overview of the design and implementation of an *Information and Communication Technology for rural education development initiative* in a resource constrained environment.

Various frameworks, models, guidelines and tools were developed by adopting Design Science Research as the chosen methodology. Certain specific case study phases were applied within the Design Science Research process and lessons were learnt in each phase which was documented as the initiative moved from one phase to the other. Certain steps were followed during each phase. The book provides an overview of how each of the components, within the ICT4RED Implementation Framework (Section 2), were managed and how they were operationalised to provide specific deliverables or to reach certain aims.

The core team (one representative from each component) met once a week to track and trace progress and deliverables. What emanated from this ICT4RED initiative was far more than just frameworks, models, processes or tools, to be tested and refined, it was a *change* in the way 350 teachers (in 26 schools) applied technology and teaching strategies to support their teaching and learning and to improve their 21st century teaching skills. This initiative can be viewed as a successful intervention within a specific period of time involving specific people in a specific context where technology was deployed to support education.

What became evident from this initiative was that it was NOT about the technology, but about the PEOPLE who are empowered to use the technology in order to improve their lives and that of their learners!

New technology is common, new thinking is rare.

- Sir Peter Blake-

This book will guide readers through the journey of this initiative and it is hoped that it will inspire all new prospective students, teachers and academia to realise that the value of using technology does not lie in that it can ever replace the teacher, but that it can *enhance* teaching and learning and *transform* traditional teaching methods in a classroom. This transformation can only be successfully done where technology is earned and not just given away or provided free of charge.

The book is divided into Sections (1-9). **Section 1** provides the Introduction and Background to the ICT4RED initiative and describes how the ICT4RED Framework evolved and how it was adapted after every phase. The methodology, which underpinned the development of the framework, is also dealt with.

Section 2 delivers an overview of the ICT4RED implementation framework, as one of the key artefacts to describing the ICT4RED initiative.

Section 3 summarises how Teacher Professional Development (TPD) was developed and deployed.

Section 4 covers the importance of the Monitoring and Evaluation framework and how it was applied in the ICT4RED initiative, over a period of 3 years. It is not the intention to focus on results but to share *how* the M&E framework was used to obtain results and effect impacts.

Section 5 provides details regarding Initiative Management, Operations Management and School ICT. The focus is on *how* the ICT4RED initiative applied different processes, used certain tools and actioned suppliers to equip schools and teachers in the Cofimvaba school district.

Section 6 addresses the ways in which Change Management and Stakeholder Management contributed to the integration of technology in a resource constraint community in a specific context.

Section 7 focusses on Sustainability and how value is derived through improved decision-making. The issue of sustainability, and how it plays an important role in the ICT4RED initiative, is discussed. Total Cost of Ownership-, Cost utility- and Tablet selection-models, which were developed to address sustainability, are also discussed.

Section 8 deals with the use of social media in the management of the ICT4RED initiative. The Twitter and WhatsApp feeds (over a period of time)

were analysed and provided some interesting results.

Section 9 provides a synthesis in which the objectives and aims, and how these were achieved, are addressed. This last section also looks at changes, which were eminent in the context of the initiative, and ends with some recommendations for similar future endeavours.



Photo 1-1: TPD Phase 2

Acknowledgement

This work acknowledges the TECH4RED Initiative, and more specifically the ICT4RED component, which is supported by the Department of Science and Technology, the Department of Rural Development and Land Reform, the Department of Basic Education and the CSIR for allowing us to collect data from the participants in the Nciba district of Cofimvaba in the Eastern Cape Province of South Africa to inform this work. We also acknowledge the support provided by the Eastern Cape Provincial Department of Education, the ICT4RED core team, other outsourced companies and universities. Special recognition has to be given to the district officials, circuit manager, local suppliers, teachers, learners, parents and community of the Nciba circuit in the Cofimvaba School District who have enthusiastically embraced this initiative and have become co-creators of their own destiny and innovation.

It is not about the technology; it is about sharing knowledge and information, communicating efficiently, building learning communities and creating a culture of professionalism in schools. These are the key responsibilities of all educational leaders.

- Marion Ginapolis-

Initiative Participants

The following participants are recognized:

- CSIR Meraka Institute (Initiative Management and component championing)
- Department of Science and Technology (DST) and Department of Rural Development and Land Reform (DRDLR) (Initiative Sponsors)
- DST, DRDLR, Department of Basic Education (DBE) and Eastern Cape Education Department of Education (Initiative Stakeholders)
- Human Science Research Council (HSRC) (Monitoring and Evaluation of TECH4RED)
- Benita Williams Consultants (Monitoring and Evaluation)
- Impact Advantage (Modelling)
- CoZaCares Foundation (Content)
- Maskew Miller Longman (Content)
- Pearson (Content)
- SchoolNET SA (Teacher Professional Development)
- AfroFusion (Communication)
- Hive Holdings (Technology infrastructure design, Operations Management)
- Tipp Focus (Change Management)
- Nelson Mandela Metropolitan University Govan Mbeki Mathematics Development Unit (Content)
- Fort Hare, Rhodes, Nelson Mandela Metropolitan University, University of Pretoria, University of Johannesburg, University of the Free State, University of South Africa, University of Manchester, Monash University (Postgraduate students and Research)
- Faranani (Professional Services)
- University of Pretoria (Ethnography and Content)
- Lymmyl Technologies (ICT Infrastructure Implementation and Support)
- Liquid Telecom (Satellite Connectivity)
- Maggie Verster (Teacher Professional Development)
- Sandy Malapile (Stakeholder Management)
- Uys du Buisson (Operations Management)
- Redline (Wireless Mesh Networks and Wi-Fi Implementation)
- Google South Africa (Technology infrastructure)

Section 6. Change management

M Herselman and SchoolNET SA³

In Section 1 the importance of engaging with the community and to involve stakeholders even before the initiative was implemented were highlighted. If this was not handled correctly the initiative would have failed even before it started.

6.1 Changing a community

The whole community in the Cofimvaba school district was invited to stakeholder meetings as well as Mobikit deliveries. The following photos indicate the involvement of both the parents and grandparents and how they were intrigued by the new technology:



Photo 6-1: Community involvement

Although this is a rollout of mobile devices to learners, it is important not to underestimate the effect of this on the school system of the Cofimvaba school district. The schools and district officials need to be prepared for

³ <http://www.schoolnet.org.za/>

what is the beginning of a fundamental change in the way teaching and learning happens.

In order to ensure adoption and ownership of the initiative and thus its effectiveness, school management teams (SMTs), district personnel and teachers require workshops that outline the potential impact of technologies on learning as well as on school administration. In many cases, there is a need to first work with the school at a holistic level, looking at 'softer' skills within a school and district (for example, focusing on leadership and management skills; empowerment; psycho-social and emotional health; a sense of safety and security; compassion; a resilience to change etc.). The premise under which change management was undertaken includes:

- Sustainable change requires systemic design and implementation.
- Ad hoc interventions have limited or unsustainable impact and could leave harmful systemic effects.
- Systemic dynamics must be dealt with explicitly, to create readiness to embrace change, even positive change.
- Stuck systems are often identified by systemic symptoms such as:
 - Apathy/de-motivation
 - Incongruent behaviour
 - An inability to implement new skills
 - An inability to embrace change; even if it is positive change
- Re-aligning the system at crucial points of impact (catalytic points) has ripple effects throughout the system itself
- Project diagnosis of catalytic points makes coaching more targeted and meaningful and this can result in behaviour change.

The aim was to work with the schools in the Nciba Circuit and focus firstly on the 'softer' skills as outlined above. Thereafter the focus was specific to preparing each school for the technology implementation.

Schools participating in this initiative had to develop a new vision for learning in the 21st Century (as part of their ICT committee tasks). Teachers, who were part of a connected community, drew support and inspiration from the sharing of good practice and effective resources. The intention was that learners will eventually develop a sense of responsibility for their own learning.

Technology is an effective resource for supporting school-directed change. In order to allow the school community to develop their vision for transforming learning through technology integration, a change management process was undertaken that specifically included activities that:

- Develop a common vision of key e-education concepts such as e-learning, ICT integration, ICT literacy.
- Align technology integration in the school with the provincial and national educational ICT policies
- Visualise learning with ICT
- Recognise key responsibilities of the school and the district in implementing technology integration
- Recognise the ICT integration competencies expected of teachers
- Understand the role of a school manager in formulating a school technology policy
- Evaluate their school technology learning programme
- Identify critical success factors relating to integration of technology in the classroom
- Assess school readiness for technology integration
- Assess the effectiveness of the use of technology in the school

Creating ownership and buy-in from the whole community was essential for the success of such an initiative. It strengthens accountability to take care of technology especially because it has to be earned. Hansen (2008) states that ownership is one of the critical success factors that need to be considered as it plays a significant role in ensuring local buy-in and the sustainability of projects. Ownership was created when tablets were handed over. As was observed by Nkula and Krauss (2014) during the hand-over the ICT4RED team emphasized that the students should hold their teachers accountable and ask them where the tablets were if they were not using these. The project team encouraged the parents to ask their children if they were using the tablets to learn.

According to change management.com (2014) change management is crucial where impact is on how people do their jobs. Effective project management is not the only key to success. The other more important key is to manage the human side in meeting a project's objectives.

Schaefer (2008) indicates that change management is not an easy task as

reactive and proactive responses to these changes are possible. The change process can be thought of as a process, which stops the current process, makes the necessary changes to the current process and then run the new process. Therefore managing the changes requires a broad set of skills like political skills, analytical skills, people skills, system skills, and business skills.

The following are some benefits which individuals can get from change management (Change management-coach.com, 2014):

- Effective change management supports a smooth transition from the old to the new while maintaining morale, productivity, and even company image
- Provides management and staff support for concerns regarding changes
- An efficient change management process creates the correct perception of the change for staff and public
- Helps to plan efficient communication strategies
- One of the benefits of change management is that it minimizes resistance to change
- Improves morale, productivity and quality of work
- Improves cooperation, collaboration and communication
- A carefully planned approach to change reduces stress and anxiety and encourages people to stay loyal to the organization
- Increased employee acceptance of the change
- Personal loss/gain to individuals is acknowledged and addressed
- Change management reduces disruptive aspects and emphasises positive opportunities in the change process

Change management can thus increase project success. Motivation and skills of those who will be affected by the change is more important than a good strategy. Change management is of strategic importance and the ability to change and adapt quickly brings enormous advantages. Thus it was important in the ICT4RED initiative to also focus on change management as bringing in a new technology like tablets into a specific context can disrupt current ways of doing things. Tablets can be seen as disruptive technologies in the Cofimvaba school district. According to Utterback and Acee (2008) disruptive technologies affects performance and allows for lower cost, more efficiency and improve the time it takes to

perform a task. It is a powerful means for enlarging and broadening markets and providing new functionality.

At the top of this environment where the disruptive technology affect a community and more specifically schools are the principals.

6.2 Changing the principals

The principals play an important role in ensuring the acceptance and use of any technology mainly because they create environments for use and give teachers more free time to explore and apply their knowledge in using technology despite the facilities and availability of resources (Flanagan and Jacobsen, 2003; Hew and Brush, 2007 Eteokleous, 2008).The attitude and drive of the principal is important in ensuring integration (Nkula & Krauss, 2014).

Thus, to support the principal and the other managerial bodies in the schools, the ICT4RED initiative decided to include a change management strategy, because it was recognised that adequate change management is the single most important factor affecting the success of ICT in Education interventions in schools. SchoolNET SA South Africa was assigned to implement change management training.

Specific issues which were identified related to implementation issues. For example, it was felt that principals needed practical ideas on how they could manage charging of devices, monitoring how the Mobikit gets checked in or out, and handling and care of the device. It was also felt that principals lacked the ability to encourage the use of tablets in the classroom after the teachers had received training. This was because principals who had not attended training were not aware of the teaching strategies that form part of the professional development programme.

The principals were provided with a printed guideline on how to ensure the successful achievement of the ICT4RED's goals and objectives. However, given that the initiative had brought about significant changes to the way in which teaching and learning can take place in the classroom, and requires significant commitment from the teachers involved, it has become apparent that these issues concerning the lack of capacity in the principals could be a result of a lack of change leadership rather than solely a lack of expertise.

SchoolNET SA therefore proposed to focus on supporting principals, SMTs and district officials in a process of change leadership. A change leadership course was developed by SchoolNET SA to teach the principals that ICT leadership should be a shared domain and it encourages them to establish a culture of learning in the workplace and between schools in the district. If they could understand their roles and responsibilities (and those of others) in making this initiative vibrant and sustainable, and implement the principles of change leadership, they would understand their role in leading change. They also learned that a vision for ICT use in their school is an evolving process, that ownership develops over time with all stakeholders involved, and that challenges can be collaboratively solved if the vision is collaboratively developed.

This Change Leadership training was provided to principals, SMTs and district officials over a period of 7 months and covered 7 modules.

The outline of the Change Leadership course below was meant to provide the basic framework for achieving this understanding. In its implementation the course activities would:

- model the pedagogical skills,
- address the practical issues in the form of case studies which model collaborative problem solving activities,
- model peer coaching, and
- provide the principals with tools to reflect on, monitor, evaluate and communicate about what is happening in their schools.

It was also possible that a lack of an effective communication strategy within the school has led to this situation and this course will seek to help the principals to find a solution to how they can better communicate and support each other.

This outline has been influenced by literature on the key elements of change management and the debate about change leadership which is underpinned by Fullan's work (2006) on *Learning to Lead Change*; the idea that change needs energy, ideas, commitment and ownership rather than a controlling management. The following is a summary of the Change Leadership training modules which were presented in the ICT4RED initiative and which underpins the book of Fullan (2006):

Table 6-1: Change Leadership Modules overview

| Module Name | Purpose | Key questions which were addressed |
|---------------------------------------|--|---|
| 1. Facing problems | The purpose of this module is to give an overview of the ICT4RED teacher professional development course a general introduction. Perhaps more important the purpose is to launch this change leadership process by asking one of the toughest questions about change: "Why?". Understanding the moral purpose is a fundamental cornerstone of change. It is not just a statement on paper that justifies change as a commitment to learners who are disadvantaged in some way; it is a call to action that will take place in the school. It will help to justify the effort and commitment that is required to make new initiatives a lasting success in schools. | What is the problem? Focus on moral purpose, seeing change and create a shared vision. |
| 2 Understanding the change process | The purpose of this module is to develop an understanding for what change leadership is and requires of the principals. The essential elements of this are that change leadership is an ongoing process of building collective ownership of and commitment to the school's vision for learning with technology. This is not a process of coercion or trying to sell a point of view. It is a process of developing a collective understanding through the input of all the stakeholders. We include an activity in which the participants will analyse what goes wrong and what goes right and try to understand the cause of the issue. This should help them understand the important role of their leadership in building ownership and commitment. | Understanding the change process Focus on managing versus managing change and leading change, commitment and ownership. |
| 3 Capacity Building | The purpose of this module is for participants to understand and plan implementation of the key elements of capacity building. It is a collective process and it involves all stakeholders developing new skills, understandings and competencies. These are defined according to specific roles and responsibilities. One of the key roles of the change leadership is to identify the stakeholders and to delegate responsibilities to | Capacity building What new skills and understandings are required? What new roles and responsibilities are emerging? New competencies? New resources? |

| Module Name | Purpose | Key questions which were addressed |
|--------------------------------------|---|---|
| | them. They then support each other during their capacity building and in this way leadership skills are developed across a broad base of stakeholders. If one stakeholder leaves the school there will be many others to step into the breach and the growth of the school vision will be able to be sustained. | |
| 4 Facing challenges | The purpose of this module is to help change leaders understand that some problems (technical problems) can be solved by simple consultation or an expert or a manual. Other problems (adaptive challenges) are more complex and need to be analysed and considered more deeply, but can be solved collectively by the stakeholders involved. It is the responsibility of the change leaders to lead or delegate this process of tackling adaptive challenges. | How do I handle technical and adaptive challenges? |
| 5 Let us communicate change | The purpose of this module is to develop a communication strategy for the change leadership. Communication is not just about announcements, notices, persuasion and newsletters. A communication strategy requires careful thought and planning, it is about using the right people, the right messages and the right methods. Most importantly, it is about dialogue (two-way). In this activity the participants would identify what the best strategies are for them to communicate with the various stakeholders. | How to develop an IT strategy? How to communicate effectively? How do I embrace resistance? |
| 6 A culture of workplace learning | The purpose of this module is to raise awareness and start the process of developing a culture of collaborative peer-to-peer support in the school. This is a very important part of capacity building. Peers can collaboratively solve problems and come up with ideas much more effectively than individuals can. It introduces principles of ongoing peer to peer support within the school and beyond its boundaries. | How can peer coaching assist me? What are professional learning communities? |
| 7 A culture of evaluation | The purpose of this module is to promote the use of assessment and evaluation as learning strategies - because we learn something from them and change the way we do things as a | What gets measured and improved? How to create wins? How do I respond to |

| Module Name | Purpose | Key questions which were addressed |
|-------------|--|------------------------------------|
| | result. Evaluation is a cyclic appraisal of a process. Assessment tends to more often be once off and directed at the self or other individuals (as we know the purpose can be summative or formative). It also reinforces the notion that change is not an instant fix, but an ongoing, evolving process that benefits from reflection and responses. | data? |

A summarised analysis of the change in approach:

Table 6-2: Change in approach

| Instead of this: | We advocate: |
|----------------------------|-------------------|
| Accountability | Capacity Building |
| Leadership quality | Collegiality |
| Technology | Pedagogy |
| Initiatives and strategies | Systemic change |

This change leadership addressed some critical elements, which included:

Table 6-3: Critical Elements of Change Leadership

| Technical components | What are technical components that can be solved with technical solutions? | Can find technology support resources, and identify experts within the school to support others |
|----------------------|--|---|
| People | Who are the people and how must people change for this problem to be solved? | Expert teachers – must become more collaborative and supportive, must take ownership of the vision. Complaining teachers (non-users) – must negotiate and commit to an achievable goal to start on the path with technology, must understand the moral purpose, later understand and support the vision. |
| | If there is conflict, where does it emerge? | Teachers who do not want to commit resist, but no real conflict |

| Technical components | What are technical components that can be solved with technical solutions? | Can find technology support resources, and identify experts within the school to support others |
|----------------------|--|---|
| Conflict | Do all agree with the vision? | No |
| | Do all agree with the objectives of the strategy? | No |
| | Do all agree with the implementation of the strategy? | No |

These elements assisted the principals to then ask these five important questions:

1. Vision – are teachers committed?
 - How has the vision been built collectively?
 - Is there a sufficient ownership?
 - Has there been a communication strategy in place?
2. How do we deal with the resistance?
 - Should it be challenged?
 - Should they be ignored?
 - How to make a connection with them?
3. Can we use champions?
 - How can they use them?
 - Try to avoid whole staff training, make it more needs-based and context sensitive support.
 - Promote the idea of peer-to-peer discussions
 - How do you make time available?
4. How to show the way?
 - Celebrate wins, examples of exciting lessons and student work.
5. Teacher Professional Development strategy.
 - How to follow up and support what happens in the ICT4RED training.
 - Avoid pressure of badges for technology gifts – it is a negative outcome and not a sustainable source of motivation.

- Come back to moral purpose and vision as the driving forces.
- What is their action plan?

The change leadership training assisted principals to address the changes which were the result of tablet technology integration into their schools. It assisted them to develop an IT strategy and to understand their context better. Feedback from the principals was very positive about the training and they felt it was assisting them to deal with resistance, conflict and teachers. They also understood the training that the teachers had and how it can be used to develop an IT strategy and communicate with stakeholders outside of their schools.

Change management, community engagement and stakeholder management are thus important components which cannot be underestimated. Within many communities one gets the socio-political issues and if you now add socio-technical issues you can end up with a disaster!

6.3 Summary

The ICT4RED initiative is a good example of how a specific context were changed based on a soft skills focus and support before technology was provided. It also provides a good example of how ICTs, if used appropriately, have the potential to contribute to the social and political development of communities (World Bank 2009).

Torero and Von Braun (2005) argue that the so-called digital divide is not just a case of not having access to ICTs but part of a much bigger development divide. Effective access to ICTs is dependent on, amongst others, education, appropriate language skills, income, wealth and social position, and not just the availability of technology (Torero and Von Braun 2005).

The one resource that liberates people from poverty and empowers them is knowledge. Possessing knowledge is empowering, while lack of knowledge is debilitating (Nath 2001, p. 318).

Unwin (2009, p. 360) also remarks that ICT4D is not only about economic growth, but also about participation and empowerment (i.e. more on human development), and proposes that “ICTs can have a key role to play

in delivering both of these contrasting views of development". In this initiative we focussed on participation and empowerment of teachers, learners, district officials and parents (the whole community) and hopefully this will have a positive effect on their economic development as well.

The new information and communications technologies are among the driving forces of globalisation. They are bringing people together, and bringing decision makers unprecedented new tools for development. At the same time, however, the gap between information 'haves' and 'have-nots' is widening, and there is a real danger that the world's poor will be excluded from the emerging knowledge-based global economy - Anon.

The most effective route to achieving substantial benefit with ICTs in development programmes is to concentrate on re-thinking development activities by analysing current problems and associated contextual conditions, and considering ICT as just one ingredient of the solution - Roger Harris

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Photo 6-2: Fun Day 2014

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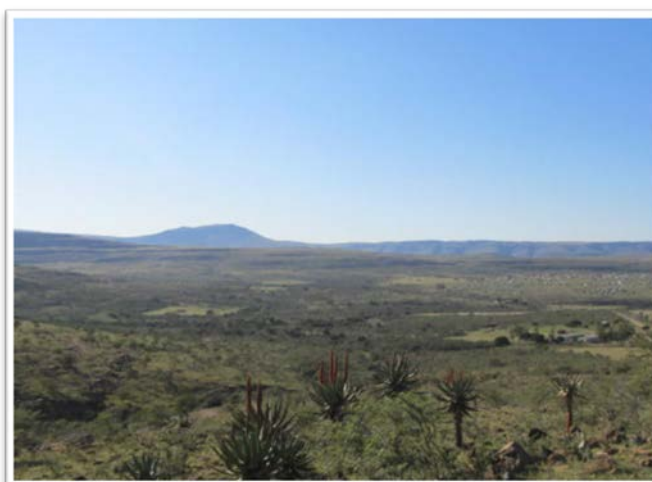


Photo 9-2: Bangilizwe Junior Secondary School

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ICT4D,
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learning
a n d
ICT
in Education



ICT4RED

Herselman, M. and Botha, A. (2014). *Designing and implementing an Information Communication Technology for Rural Education Development (ICT4RED) initiative in a resource constrained environment: Cofimvaba school district, Eastern Cape Province, South Africa*, 1 ed. 2014, CSIR Meraka: Pretoria, South Africa.

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