Outcome and Impact Assessment in the Comprehensive Evaluation of Rural ICT Projects in Developing Countries

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by

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Abstract

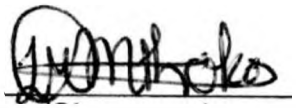
Despite existing literature that indicates that Information and communication technologies (ICTs) act as tools for social change and development, there is still limited empirical evidence that demonstrates this. An outcome and impact assessment based on a *comprehensive* (holistic) evaluation is deemed appropriate at a time when many ICT4D programmes fail to effectively demonstrate their impact towards rural development. A comprehensive evaluation is one that incorporates the evaluation of the need, design, implementation, outcome and impact, efficiency, and scalability of a programme. These stages make up the different domains of an evaluation lifecycle. The following study aims to develop an outcome and impact assessment framework for ICT4D programmes. It forms part of continuous research associated with the development of a rural ICT Comprehensive Evaluation framework.

A theoretical approach, using Design Science and Weick's theorizing process, was applied to investigate the development of a framework (design artefact) for outcome and impact assessment of ICT4D programmes. The theorizing process analysed existing outcome and impact assessment frameworks from social programmes, information systems/technology programmes, and ICT4D programmes. The output of the theorizing process proposes five critical themes of outcome and impact assessment of rural ICT4D programmes that should be assessed. These themes include: Strategic Value, Most Significant Change, Empowerment, Livelihoods, and Sustainability. To assess its utility, the framework was implemented in the Siyakhula Living Lab and Information and Communication Technology for Rural Education (ICT4RED) projects in South Africa. Through the application of the framework in real life ICT4D contexts, the lessons learned contributed to its revision and enhancement.

The proposed framework aims to guide evaluators through the assessment of outcomes and impacts in ICT4D programmes. It provides a foundation and justification for the selected outcome and impact assessment themes that contribute to a comprehensive evaluation. An outcome and impact assessment that is informed by: baseline; needs assessment; programme theory assessment; and process assessment data, provides ICT4D evaluators and project stakeholders with meaningful outcome and impact feedback. Having such an approach to outcome and impact assessment ensures that the evaluation process is seen more holistically as part of the ICT4D project as a whole.

Declaration

I declare that the Thesis titled, *Outcome and Impact Assessment in the Comprehensive Evaluation of Rural ICT Projects in Developing Countries*, which I hereby submit for the degree, Doctor of Philosophy at Rhodes University, is my own work. I also declare that this thesis has not been previously submitted by me, for a degree at this or any other tertiary institution and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.



Hafeni Mthoko

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Chapter 1: Research Introduction

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1.1 INTRODUCTION

It is often asserted that Information and communication technologies (ICTs) act as tools for social change and development; however, there is limited empirical evidence that demonstrates this (Gomez & Pather, 2012; Heeks, 2014; O'Neil, 2002; Toyama, 2011; Wagner, Day, James, Kozma, Miller & Unwin, 2005). Therefore, questions on the effects of ICTs in development still remain unanswered. The comprehensive assessment of the development contributions made by ICTs is essential for learning from the success and failure of Information and Communication Technologies for Development (ICT4D) initiatives. An Outcome and Impact assessment that forms part of a comprehensive approach to evaluation would reveal in-depth detail on the effects ICTs have on rural development.

This chapter introduces the research study. The context of the research is outlined which is followed by the goals of the research. The research methodology employed is then briefly discussed. The scope of the research and the significance of the study are briefly outlined. A discussion of the summary results is then presented. The chapter concludes with an outline of the thesis organisation.

1.2 BACKGROUND AND RATIONALE TO THE RESEARCH

It is well documented that ICTs act as tools for social change and development; however, there is limited empirical evidence to support this (Gomez and Pather, 2012; O'Neil, 2002; Wagner, Day, James, Kozma, Miller and Unwin, 2005). How ICTs facilitate development and why they have the effects they have are all important questions that should be reviewed by ICT4D programmes. Among the shortage of empirical evidence of ICT4D is a need for more social impact assessments of such initiatives (O'Neil, 2002; Rogers, Khagram, Bonbright, Earl, Carden, Ofir, and MacPherson, 2011). The social impact assessment of social programmes has often been reduced to simple tools and checklists that are manipulated to obtain particular results, or to suit selected stakeholder groups (Howit, 2011). As a result, project implementers and governments prefer to justify development projects with these simple tools and checklists (Howit, 2011). Such narrow approaches appear to endorse predetermined outcomes of policies and projects (Howit, 2011), therefore taking on a minimal approach to holistically assessing impacts. Even in cases where ICTs are found to be useful, it still remains unclear which aspects of ICT4D are effective, how they can be improved, and how these projects can be sustained (Rodriguez, Nussbaum, Lopez, and Sepulveda, 2010; Tacchi, Slater and Lewis, 2003).

Rural development is multifaceted, with strategies ranging from improvement in health, education, empowerment, skills development, employment generation and poverty reduction (Alkire and Santos, 2010; Ashley and Maxwell, 2001; Melamed, Devlin, and Appleby, 2012; Herrero, Martinez and Villar, 2010). In light of this, rural development requires a multidimensional approach for its evaluation (Alkire and Santos, 2010; Ashley and Maxwell, 2001; Herrero et al., 2010; Melamed et al., 2012). Impact assessments should then produce comprehensive results that capture a broad reflection of the project's effect on the community (Clemens and Demombynes, 2010). Many ICT4D studies (Ahsan and Raihan, 2013; Alampay, 2006; Parkinson and Ramírez, 2006; Ei Chew, Ilavarasan, and Levy, 2013; Duncombe, 2006; Kumar and Best, 2006; Marathe, O'Neill, Pain, and Thies, 2015; Molla and Al-Jaghoub, 2007; Tabassum and Yeo, 2015; Underwood, Revi, and Bennett, 2013; Yafi, Nasser, and Tawileh, 2015) conduct impact assessments with limited reference to preceding evaluations in a project's lifecycle. For example, projects assess for impacts in silos with minimal reference to preceding evaluation data (from earlier stages of a project), such as needs assessment data, programme theory assessment data, and process assessment data. Such an approach is not as valuable as one that is integrated within a more comprehensive monitoring and evaluation system (Kreber and Brook, 2001; Rogers, et al., 2011). A comprehensive system would be an improvement to analysing development and further strengthening an ICT4D project's contribution towards development (Kreber and Brook, 2001; Rogers, et al., 2011). Furthermore, there often is no clear indication as to what aspects of a project should be evaluated; rather, emphasis is placed on how the evaluation should take place. As a result, evaluations that form part of a continuous monitoring and evaluation system that adapts as a project progresses contribute to more informed impact assessments (Clemens and Demombynes, 2010; Department for International Development, 2005; Gomez and Pather, 2012; O'Neil, 2002; Ramírez, 2011; Rodriguez et al., 2010; UNCTAD, 2011; Wagner et al., 2005).

In many cases, ICT4D impact assessments are based on the before and after effects of a project (Heeks and Molla, 2009). However, the expected outcomes as measured against the project objectives do not always reflect the true negative, positive, intended and unintended impacts of the project (Gomez and Pather, 2012; Gomez, Reed, and Chae, 2013; Reilly and Gomez, 2001; Tabassum and Yeo, 2015). Merely knowing the changes that have occurred from an ICT project is not sufficient. For example, evaluating the outcomes of an ICT intervention cannot

be achieved without first assessing the extent to which ICTs were implemented as intended (Bailur, 2007; Wagner et al., 2005). Considering *how* an ICT initiative has impacted a community and *why* a particular impact has occurred are important aspects of impact assessment that enhance learning and further contribute to development (Kreber and Brook, 2001; Rogers, et al., 2011; Pade-Khene and Sewry, 2011). As a result, a balanced assessment is required – one that reflects the broad effects of an ICT programme on a community and the wider society (Reilly and Gomez, 2001). This may require new theories of ICT evaluation – theories that will enhance a deeper understanding of the effects of ICTs in terms of development (Gomez and Pather, 2012).

Wieman, Gast, Hagen and Van der Krogt (2001) and the World Bank (2011) define evaluation as an assessment of the worth of a project/programme: its design, implementation and effects. Consequently, the assessment of ICT4D projects should take into account: the evaluation of the readiness of the community; availability of resources; uptake of the programme; assessment of use and processes; and assessment of impact (Wieman et al., 2001; World Bank, 2011). Alternatively, Batchelor and Norrish (2006) consider it standard good practice that ICT pilot projects be evaluated throughout their planning, implementation, and post-implementation stages, with the aim of gaining a more holistic understanding of the entire project and its effects on a community (Batchelor and Norrish, 2006).

Looking at the ICT4D value chain (readiness-availability-uptake-impact), proposed by Heeks (2009), the focus of ICT4D assessments has changed over time. The emphasis of ICT4D evaluation has shifted towards the assessment of impacts (Ahsan and Raihan, 2013; Alampay, 2006; Duncombe, 2006; Marathe et al., 2015; Molla and Al-Jaghoub, 2007; Parkinson and Ramírez, 2006; Tabassum and Yeo, 2015; Underwood et al., 2013; Yafi et al., 2015) as opposed to the preceding value chain stages: readiness, availability, and uptake. However, for a more holistic understanding of the effects of an ICT4D programme on a rural community, an outcome and impact assessment should take into account the preceding stages from the ICT4D value chain.

Rossi, Lipsey and Freeman (1999: 22) define programme evaluation as an evaluation that:

> "... generally involves assessment of one or more of five programme domains: (a) the need for the programme (b) the design of the programme (c) the programme

> implementation and service delivery (d) the programme impact or outcomes, and (e) programme efficiency (cost effectiveness)."

When a programme evaluation entails all these domains, it is termed a *comprehensive* evaluation. Rossi et al. (2004) suggest that the evaluation of social programmes, of which ICT4D forms part, need to be evaluated across all five programme domains (Rossi et al., 2004; Shadish, Cook, and Leviton, 1991). In an ICT4D context, Pade-Khene and Sewry (2011: 326) therefore define a comprehensive rural ICT evaluation as:

> "The comprehensive application of all appropriate domains of evaluation throughout the life of a rural ICT project, in ways that are adapted to the social, political, cultural, and economic rural environment, and designed to inform ICT interventions to improve and support rural development."

Figure 1.1 illustrates the Rural ICT Comprehensive Evaluation Framework (RICT-CEF), which consists of seven domains of evaluation in sequential order of application: Baseline Study, Needs Assessment, Programme Theory Assessment, Process Assessment, Outcome and Impact Assessment, Efficiency Assessment and Scalability Assessment. Each evaluation domain applies a different approach of analysis and provides results that interdependently build on other domains of evaluation to create a more reflective iterative evaluation (Pade-Khene and Sewry, 2011).

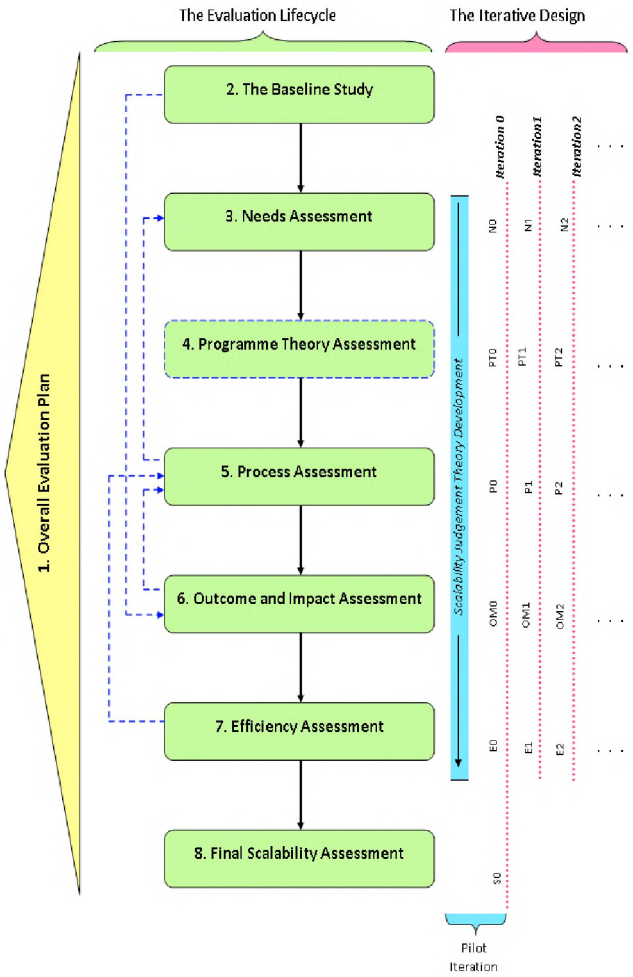


Figure 1.1: The Rural ICT Comprehensive Evaluation Framework (RICT-CEF)

This research specifically focuses on the *Outcome* and *Impact Assessment* domain, as part of on-going research on the RICT-CEF, which has been applied in the Siyakhula Living Lab ICT project. The Outcome and Impact Assessment domain assesses the intended and unintended (negative and/or positive) effects of an ICT4D project on the target community and the wider society. For the purpose of this research study, an *outcome* assessment of ICT4D is defined as one that aims to evaluate the immediate and direct resulting outputs of a project; whereas an *impact* assessment aims to evaluate the long-term effects of a project on a target community and the wider society (Pade-Khene and Sewry, 2011; Rogers, et al., 2011; Wagner et al., 2005: 7). Therefore, this research proposes an Outcome and Impact Assessment Framework for rural ICT4D projects that is informed by a comprehensive approach to evaluation.

1.3 GOALS OF THE RESEARCH

This research aims to identify and formulate key themes that should be assessed when conducting an Outcome and Impact assessment of rural ICT4D projects, as part of a comprehensive approach to evaluation. The research forms part of on-going ICT4D evaluation research and is based on the RICT-CEF comprehensive evaluation framework.

1.3.1 Research Objectives

The objectives of the research study are:

a) To identify the key themes that contribute to an Outcome and Impact assessment of ICT4D initiatives that forms part of a comprehensive approach to evaluation.

b) To develop an ICT4D Outcome and Impact assessment framework that forms part of a comprehensive approach to evaluation.

c) To demonstrate an outcome and impact assessment of ICT4D initiatives based on a comprehensive approach to evaluation.

1.3.2 Research Questions

This research will be guided by the following main research question:

1) How can an outcome and impact assessment of rural ICT4D initiatives follow a comprehensive approach to evaluation?

The main research question comprises the following sub-questions:

1.1) What are the key Outcome and Impact themes that contribute to a comprehensive approach to evaluating rural ICT4D projects?

1.2) What are the key components of an Outcome and Impact assessment that forms part of a comprehensive approach to rural ICT4D evaluation?

1.4. RESEARCH METHODOLOGY

To conduct this research a qualitative design science research approach is employed. Within this approach, knowledge and understanding of a problem and its solution are achieved through building and applying a designed artefact (Hevner, March and Park, 2004). The approach is considered suitable as the outcome and impact assessment framework (the artefact) is created and its use and performance is then evaluated. This will be achieved through the actual

assessment of a rural ICT4D case (Hevner et al., 2004). The research aims to identify critical themes for the Outcome and Impact assessment of rural ICT4D (Chapter 6) based on a comprehensive approach to evaluation. Moreover, the observations and reflections (Chapter 9) of the application of the outcome and impact assessment framework would reveal the suitability and shortcomings of the proposed framework (Chapter 10).

The research is divided into two levels of empirical investigation. The first level focused on the actual outcome and impact assessment of two rural South African ICT4D projects (Appendix E and G) and the second level focusing on the researcher's observations and reflections (Chapter 9) of the Outcome and Impact assessment to identify lessons learned from the actual implementation of the framework.

A case study strategy is employed. The Siyakhula Living Lab (SLL) project and the Information and Communication Technology for Rural Education Development (ICT4RED) initiative will serve as the case studies, whereby the Outcome and Impact assessment framework will be implemented and evaluated. Using the case study strategy, the researcher is able to gain a holistic understanding of the framework in a real life context. The SLL, is situated in the rural Transkei of South Africa, where it introduced computers and computer literacy training to community members of the Mbashe municipality. The SLL aims to develop a distributed, multifunctional community platform, to deploy in marginalised and semi-marginalised communities in South Africa. The SLL currently operates through the schools in the Mbashe municipal area as venues for ICT deployment. The ICT4RED project is a pilot initiative that tested the use of tablet technology in 26 rural schools in the Cofimvaba school district, in the Eastern Cape province of South Africa. The ICT4RED project aims to improve teaching and learning in the Cofimvaba school district, and move schools towards a 21st-century schooling environment. Figure 1.2 outlines the research design that is used in this study.

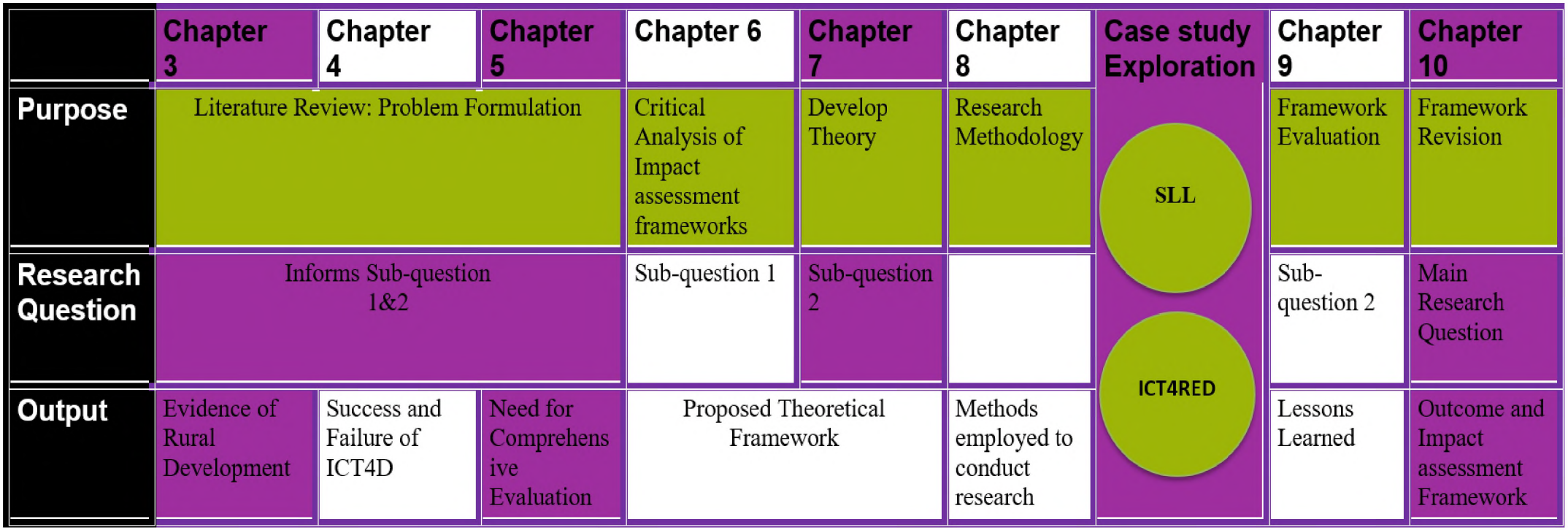


Figure 1. 2: Overall Research Design

The overall research process comprises the following aspects:

- **Approach:** ***Design Science***
- **Strategy:** ***Case Study***
- **Data collection:**
  - ***Literature review***
  - ***Participant observations***
  - ***Interviews***
  - ***Documentation***
- **Data analysis:** ***Thematic Analysis and Explanation Building***

1.5. RESEARCH SCOPE

This study was grounded in the evaluation of rural ICT4D with a specific focus on Outcome and Impact assessment. In order to answer the research questions it was necessary to examine existing impact assessment frameworks from the primary domains (Development studies, Information Systems/Information Technology studies and ICT4D studies) that impact ICT4D. As a result of the analysis of existing literature, an Outcome and Impact assessment framework was developed, and presented in Chapter 7 of the study. As part of the framework valuation, it was applied in two rural ICT4D initiatives. The study was restricted to South African ICT4D initiatives and did not include other developing countries.

1.6. RESEARCH SIGNIFICANCE

Many ICT4D initiatives have failed to produce positive results as emphasis is often placed on the technology itself rather than understanding the relationship between ICTs and the rural development process (Heeks, 2005; Toyama, 2011). Given the post-2015 development agenda, new priorities for ICT4D policy, practice, and research are being proposed (Heeks, 2014). Among these priorities is the need to address the continued gap in the areas of accountability and transparency in ICT4D (Heeks, 2014). Naturally, part of the process of accountability and transparency is the evaluation of ICT4D. Increased access to ICTs does not guarantee meaningful use of ICTs and subsequent meaningful impacts. In view of that, a review of the implementation, use, outcome and impact of technology in rural communities is required, in order to fully understand the role ICTs play in aiding poverty alleviation (Batchelor and Norrish, 2006: 2; DeLone and McLean, 2003; Heeks, 2006; White, Killick and Kayizzi-Mugerwa, 2001). Such a review needs to be *comprehensive* and capture a holistic

understanding of the effects that ICTs have on social development (Gomez and Pather, 2012). The proposed framework captures the need to conduct Outcome and Impact assessments that are embedded in a comprehensive approach to evaluation. The framework seeks to guide evaluators in holistically assessing the contribution ICTs make towards human development and consequently develop successful ICT4D initiatives.

1.7. SUMMARY OF RESULTS

The key results of the thesis are outlined as follows:

- **Problem Formulation**
  - As poverty in rural areas is more widespread than that of developed regions, the sustainable development of rural areas is important. Rural development is viewed as a multidimensional process and requires multiple measures (both economic and non-economic) of development progress. Information and knowledge are essential in poverty reduction and aid in achieving development goals. ICTs, as tools, could facilitate rural development. They are well known enablers of change and when appropriately employed they can enhance rural development.

  - Often ICT4D projects have failed to make a significant contribution towards rural development. A common challenge of ICT4D projects has been the limited demonstration of ICT4D impact due to the limited understanding between ICTs and rural development. Therefore, a rigorous assessment of ICT4D effects is necessary to demonstrate the role ICTs play within rural development. A comprehensive evaluation is recommended to capture the relevant impact and effectiveness of rural ICT projects. A comprehensive evaluation would take into consideration preceding evaluations of the project lifecycle, which has been lacking in ICT4D research. An outcome and impact assessment that forms part of a comprehensive approach would demonstrate the intended and unintended ICT project effects.
- **Theoretical Development**
  - The evaluation of ICT4D outcome and impact should centre on critical themes of assessment. Critical themes of outcome and impact assessment represent the key aspects of a rural ICT project that should be assessed when conducting such an evaluation.

- The assessment of rural ICT project outcomes and impacts requires the identification of relevant critical themes. The identification of themes required the assessment of existing approaches from three disciplines: Social Programmes, Information Systems Programmes and Rural ICT4D Programmes. The analysis of nine assessment approaches revealed five critical themes for the outcome and impact assessment of rural ICT projects. These include: *Strategic Value, Most Significant Change, Empowerment, Livelihoods and Sustainability.* The identified critical themes create a foundation for the proposed framework for assessing the outcomes and impacts of rural ICT projects.

- **Empirical Investigation**

  The proposed framework is applied in the Siyakhula Living Lab and the ICT4RED projects, which yield lessons learned from a reflective evaluation of the framework.

- **Research Outcome**

  Based on the lessons learned, the framework is revised and an enhanced Outcome and Impact assessment framework is presented. A major revision made was the collapse of the Most Significant Change outcome and impact theme. The assessment of Most Significant Change has been altered to function as an essential method throughout the assessment process rather than as a critical theme for assessment. Moreover, the revised framework draws emphasis to framework components, such the "Stakeholder relationships" that were previously taken lightly in the initial framework.

1.8. THESIS ORGANISATION

The thesis chapters are organised as follows:

Chapter 1: Research Introduction

This chapter introduces the research study. The research context is outlined to provide background and perspective to the research. The aims of the research and the methodology followed are also discussed. The chapter concludes with a summary of the key findings from the research.

Chapter 2: Research Structure

The research philosophy on which this research is founded is presented. As part of the presentation of the research philosophy, the overall process followed to answer the research questions is discussed.

Chapter 3: Rural Development

This chapter outlines the importance of rural development and the challenges faced by rural communities. The chapter further outlines the multiple measures available to determine the level of development that has taken place. The chapter concludes that information and knowledge plays a role in the alleviation of poverty and facilitation of rural development.

Chapter 4: ICTs for Rural Development

This chapter provides contextual background to the ICT4D field. It outlines the role ICTs play in facilitating various rural development goals. Furthermore the chapter discusses the challenges of implementing ICTs within rural communities, the factors that lead to project failure. The chapter concludes that there is a need for the continued monitoring and evaluation of ICT4D programmes.

Chapter 5: Monitoring and Evaluation of ICT4D

This chapter explores the importance of ICT4D evaluation and more specifically the need for outcome and impact assessment. The challenges encountered when assessing project impact are outlined and it is concluded that new and comprehensive assessments of ICT4D outcome and impact are required.

Chapter 6: An Analysis of Impact Assessment Frameworks – Critical Analysis

This chapter conducts a comparative analysis of nine frameworks from literature. The chapter aims to identify critical outcome and impact themes for the outcome and impact assessment of Rural ICT4D. The themes highlight the key aspects of an ICT4D initiative that should be assessed when conducting such an assessment.

Chapter 7: Proposed Framework for the Outcome and Impact assessment of Rural ICT Projects.

This chapter proposes a framework for assessing the outcome and impact of Rural ICT projects. The proposed framework comprises three main components: the critical themes of outcome

and impact assessment, the preceding evaluation domains of the RICT-CEF that inform, the proposed framework and evaluation guidelines to take into account when embarking on such an assessment.

Chapter 8: Research Methodology

The research methodology guiding this research study is presented. The research strategy and the case study design process are described.

Chapter 9: Case Study Exploration of the Siyakhula Living Lab and the ICT4RED Project

This chapter provides a case study description of the evaluation of the Siyakhula Living Lab (SLL) and the ICT4RED projects using a prototype of the Outcome and Impact assessment framework. The applicability and shortcomings of the framework are described and lessons learned from the application of the Outcome and Impact assessment framework in the two case studies.

Chapter 10: An Enhancement to the Outcome and Impact Assessment Framework

This chapter presents an overall revision of the existing theoretical Outcome and Impact assessment framework based on lessons learned from the analysis of the SLL and ICT4RED project.

Chapter 11: Conclusion and Future Research

This chapter concludes the research study. It outlines the contribution of the research and identifies aspects for future research.

Chapter 2: Research Structure

2.1 INTRODUCTION

2.2 RESEARCH PARADIGM

2.2.1 Design Science Research Cycles

2.2.1.1 Relevance Cycle

2.2.1.2 Rigour Cycle

2.2.1.3 Design Cycle

2.2.2 Design Science Research Guidelines

2.2.3 Design Science Research Process

2.4 CONCLUSION

2.1 INTRODUCTION

The previous chapter outlined the aims of the study, including the problem statement, research questions and research objectives. This chapter aims to describe the research process followed to answer the research questions. As discussed in Chapter 1, the main research question seeks to develop an Outcome and Impact assessment framework that forms part of a comprehensive approach to evaluation. The overall research process followed to answer the research questions is depicted in Figure 2.1. This chapter first identifies the research philosophy – Design Science – driving the research study. It outlines the Design Science Research Cycles and Design Science Guidelines employed. The chapter concludes with a summary of the Design Science research process followed to fulfil the purpose of this study.

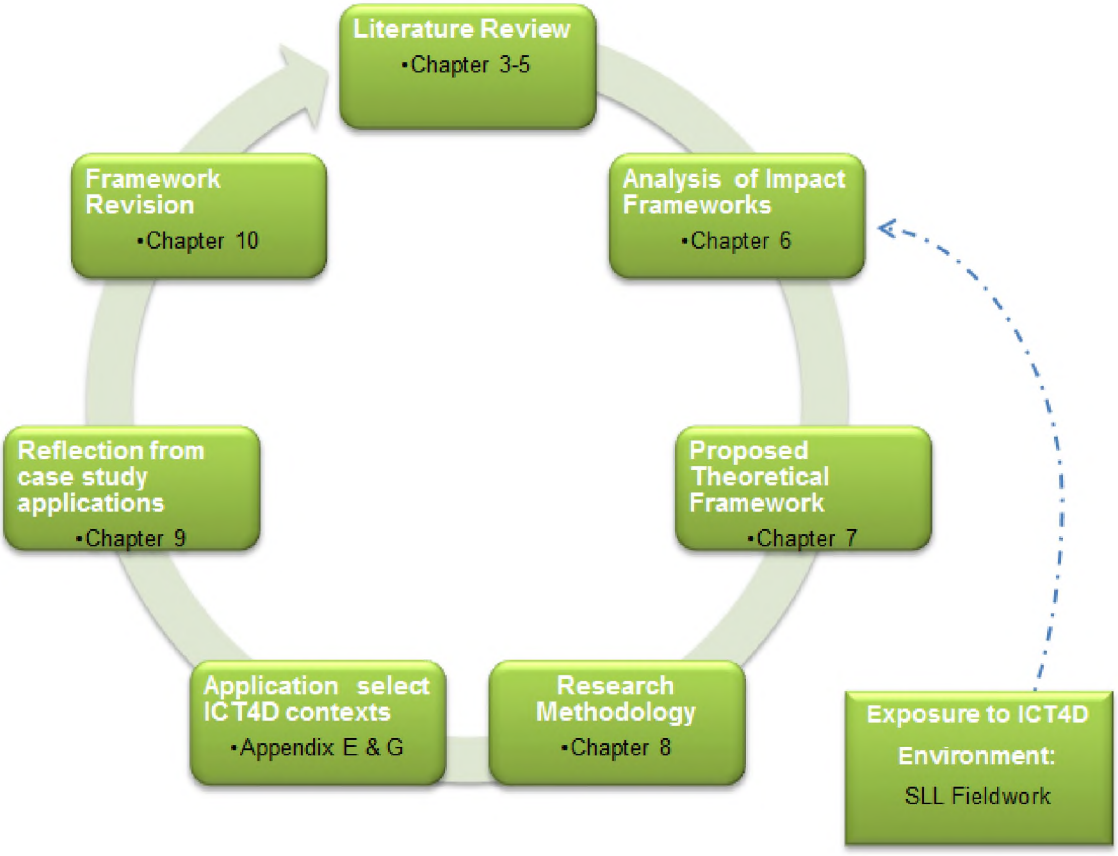


Figure 2. 1: Overall Research Process

2.2 RESEARCH APPROACH

The research study applies the Design Science approach. Within this approach, knowledge and understanding of a problem and its solution are achieved through building and applying a designed artefact. Design Science artefacts can either be constructs, models, methods, or instantiations. The approach is selected as it provides a suitable platform to develop an Outcome and Impact assessment framework (the artefact) and evaluate its use and performance in a real life environment. The use and performance of the Outcome and Impact assessment framework is achieved through the actual outcome and impact assessment of two rural ICT4D projects (Hevner and Chatterjee, 2010; Hevner, March and Park, 2004).

It should be noted that Action research (AR) and Research through Design (RtD) are alternative approaches that could be applied within this research study. However, RtD often focuses on commencing with a design problem and through the design process research emanates (Basbelle and Halskov, 2012); whereas the following research study emanates from a research problem through which an Outcome and Impact assessment framework is designed. Moreover, there have been several debates (Cole, Purao, Rossi and Sein, 2005; Iivari and Venable, 2009; Järvinen, 2007; Øgland, 2009; Papas, O'Keefe and Seltsikas, 2012) on the similarities between Action Research and Design Science Research. Despite the similarities, the following research study takes on the stance that the Outcome and Impact assessment framework (artefact) is central to the study, which is key to Design Science. Whereas, Action Research does not always require an artefact (Johannesson and Perjons, 2012) and where an artefact is developed it is a "by-product of the research intervention" (Papas *et al.*, 2012: 156).

Design Science is a useful approach in situations where key questions related to users, rural development, and ICTs need to be addressed. It is a "socio-technologically-enabled-contextually-situated research approach that can also serve for socially-constructed development aspects of ICT4D research" (Islam and Grönlund, 2012: 133). Using the Design Science approach, emphasis is placed on developing the Outcome and Impact assessment framework (artefact) by employing Weick's (1989) theorising approach, and evaluating its effectiveness in relation to development goals (Islam and Grönlund, 2012).

The proposed Outcome and Impact Assessment Framework seeks to guide evaluators in assessing the contribution ICTs make towards human development as part of an existing comprehensive approach to evaluating such projects. The following stages take place:

- **Construction and implementation of the Outcome and Impact assessment framework**: The Design Science approach relies on rigorous methods in the construction and application of the design artefact. The design artefact is in the form of a conceptual framework (Gregor and Hevner, 2013). that provides guidance on a more holistic approach to assessing for outcomes and impacts in ICT4D initiatives. Knowledge is developed through creating the conceptual framework and its application (Gregor and Hevner, 2013). The construction and application of the design artefact is achieved through developing the framework through Weick's theorising approach (Weick, 1989) and using the framework as a tool to conduct an actual outcome and impact assessment of the Siyakhula Living Lab and ICT4RED initiatives (Hevner et al., 2004). Weick's (1989) process of theorising is encapsulated around three components: 1) Problem Formulation, 2) Thought Trails, and 3) Selection Criteria. Using these three components, Weick (1989) describes theorizing as 'disciplined imagination', where *discipline* is exercised when "there is the consistent application of selection criteria to trial-and-error thinking" (Weick, 1989: 516), and *imagination* emerges when there is deliberate diversity in problem statements, thought trials, and selection criteria.
- **Evaluation of the artefact implementation**: The application of the Outcome and Impact assessment framework provides a platform for learning and understanding the nature of the ICT problem, the rural ICT environment and possible solutions. A descriptive reflection on the application of the artefact is needed to aid in learning and improve the effectiveness of the framework. The reflective exercise entails:
  - Reflecting on how the suggested components of the framework – Evaluation Guidelines, Outcome and Impact assessment themes, and Preceding Domains of evaluation – and suggested assessment methods are employed to conduct the Outcome and Impact assessment of the selected ICT4D projects.
  - Reflecting on the suitability of the framework in the SLL and the ICT4RED project initiatives.

  This reflective exercise is based on the Design Science approach and allows the researcher to make a qualitative reflective account of the application of the proposed framework in the rural ICT4D cases to be studied.
- **Revision of the proposed framework**: The application of the Outcome and Impact assessment framework and the assessment of its utility initiate the reflective process of the

proposed framework. This process aids in the subsequent revisions of the framework. Revisions to the proposed framework incorporate the lessons learned from its application and the reflective exercise. The continued incremental and iterative improvement of the framework improves the ability to transfer and contextualise the framework to different environments. Table 2.1 highlights the iterations the following research study underwent to improve the framework.

Table 2. 1: Research Iterations

Iterations	Description
Formulate research problem	The first iteration of the research involved developing the conceptual problem as a means to providing a solution to the identified problem. The development process involved reference to literature and continued research field trips to the selected case studies as a way to continuously inform the conceptual framework. The developed framework was then applied to the SLL, which lead to reflecting on ways in, which the framework could be better applied (in terms of processes) in future iterations.
Conceptual framework design and development.	
Contextualising conceptual framework to 1st case study	
Application of conceptual framework in 1st case study	
Observe and evaluate outcome and impact assessment framework	
Contextualising outcome and impact assessment framework to 2nd case study	Based on the lessons learned from the application of the artefact in the SLL, the researcher was better equipped at contextualising the conceptual framework to the ICT4RED. Continued lessons from the application of the artefact in the 2nd case study were documented.
Application of outcome and impact assessment framework in 2nd case study	
Observe and evaluate outcome and impact assessment framework	

Comparative reflection of outcome and impact assessment framework application	The lessons learned from both case studies were reflected upon to better inform an improved artefact.
Common enhancements to outcome and impact assessment framework	Based on the comparative reflection of the artefact in both case studies, the artefact was formally enhanced and redefined to incorporate the lessons learned.
Communication	Future communication of outcome and impact assessment framework through different scholarly publications leads to continued evaluation and improvement of framework.

2.2.1 Design Science Research Cycles

Figure 2.2 demonstrates the Design Science research cycles that are applied within this research. The Design Science cycles form part of the IS research framework adopted from Hevner et al. (2004). According to Design Science, there should be evidence that the Outcome and Impact assessment framework worked or did not work. Therefore, the application of the designed artefact in an appropriate environment is important. The identification and development of the Outcome and Impact themes based on Weick's (1989) theorising process represent the Design Cycle and the Rigour Cycle. The process of analysing appropriate theories and methods for the development and evaluation of the proposed framework takes place within these two cycles. Such a process contributes to the existing knowledge base of ICT4D evaluation. Furthermore, through a continuous cycle of creating, evaluating and refining the design of the Outcome and Impact assessment framework, the framework is then applied within a suitable environment to determine its suitability and relevance.

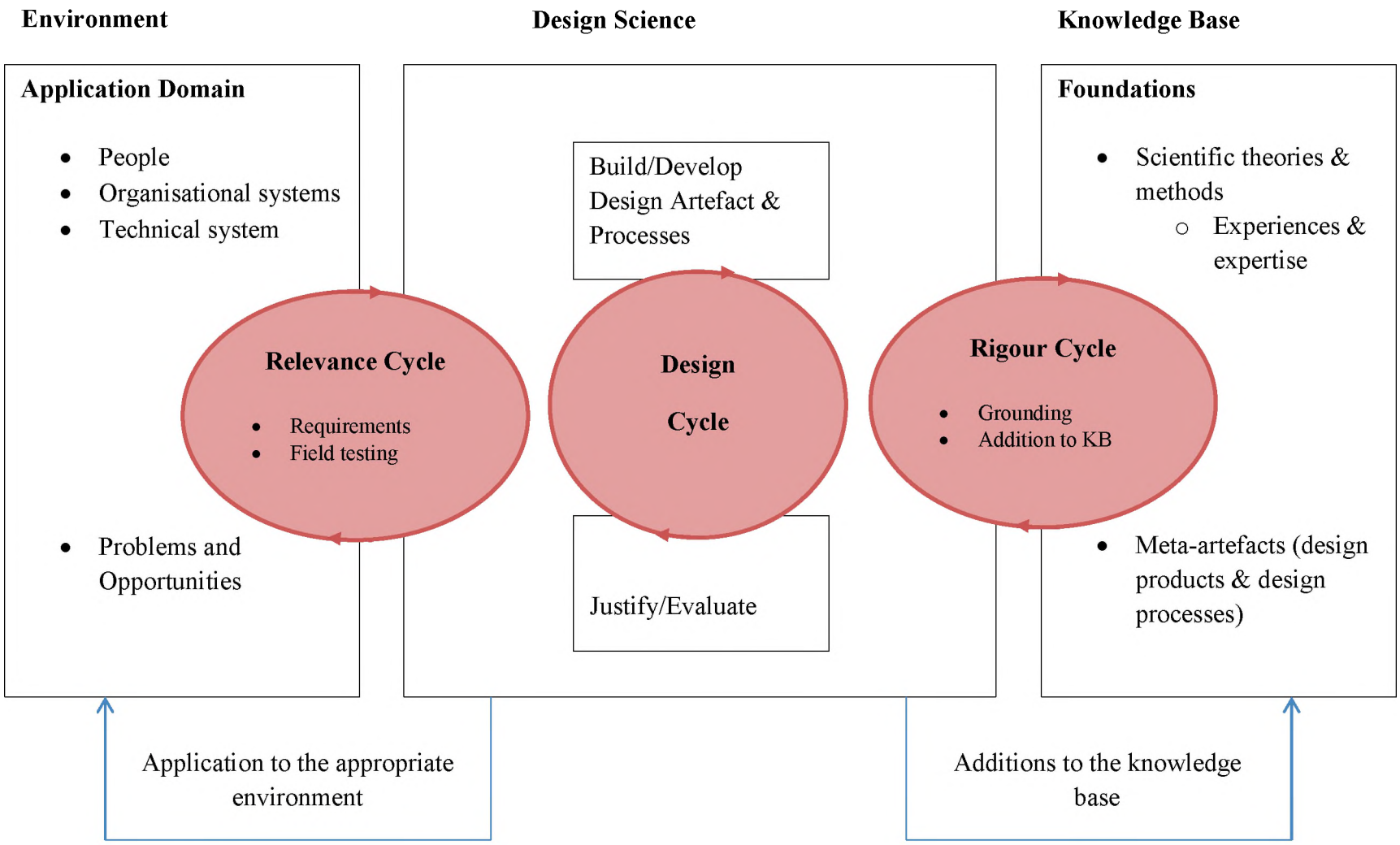


Figure 2.2: Three cycles of Design Science Research

(Adapted from Hevner, March, Park and Ram, 2004: 80)

2.2.1.1 Relevance Cycle

Design Science research is initiated by the relevance cycle (Hevner et al., 2004; Hevner, 2007). The relevance cycle associates the design process with the environment in which the project resides. The relevance cycle represents the application domain in which designed artefacts are applied and tested for their relevance and suitability. Design Science research desires to improve or solve problems within the application domain (Hevner et al., 2004; Hevner, 2007). It is made up of people, organisational systems, problems and opportunities to be addressed. The application domain also hosts the criteria by which designed artefacts are evaluated for their relevance in the application domain (Hevner et al., 2004; Hevner, 2007). The results from applying the artefact in a suitable environment determine whether further implementation and testing of the artefact is required. This research seeks to design an Outcome and Impact assessment framework that rests within a comprehensive approach to evaluation. An outcome and impact assessment that forms part of a comprehensive approach to evaluation yields results that improve the learning and understanding of the role ICTs play within development. As part of the design of the framework, it is applied within two ICT4D environments to determine its suitability. The application of the framework will require an actual outcome and impact assessment of the selected ICT4D projects.

2.2.1.2 Rigour Cycle

The rigour cycle represents the knowledge base in Design Science research. It ensures that Design Science research is founded in past knowledge to ensure innovation is indeed taking place. A researcher's selection and application of suitable theories and methods for the development and evaluation of the designed artefact determines the rigour of Design Science research. Moreover, Design Science research adds to the knowledge base through the extension of existing theories and methods, the development of new artefacts and the experiences gained from the application and evaluation of the designed artefact in the application domain. In this research the rigour cycle provided relevant theories on outcome and impact assessment and theories on comprehensive evaluations in social programmes, found through the literature review (Chapters 3 to 5) and theoretical analysis (Chapter 6).

2.2.1.3 Design Cycle

Key to any Design Science research is the Design cycle. Within this cycle, the research activities iterate between the development of the artefact, its evaluation and its revision to refine

its design (Hevner et al., 2004; Hevner, 2007). The construction and the evaluation of the artefact are based on relevance and rigour. The requirements for the evaluation of the artefact are drawn from the Relevance cycle; while the knowledge necessary for its design and evaluation are drawn from the Rigour cycle. In this research, the design cycle involves the construction and evaluation of the Outcome and Impact assessment framework (Gregor, 2006). The theorising approach proposed by Weick (1989) is employed as a guiding tool towards constructing the Outcome and Impact assessment framework. Drawing on literature and experience in an ICT4D initiative, the development of the framework takes place.

2.2.2 Design Science Research Guidelines

Design Science is mainly a problem solving approach and comprises seven guidelines for its effective application and for Design Science research to be complete (Hevner et al., 2004). The seven guidelines as outlined by Hevner et al. (2004) include design as an artefact, problem relevance, design evaluation, research contributions, research rigour, design as a search process and communication. Table 2.2 outlines the seven guidelines applied in this research.

Table 2.2: Design Science Research Guidelines Followed

DSR Guideline	Application to Artefact Design
Guideline 1: **Design as an Artefact**. DSR should produce an artefact, which can be a construct, a model, a method, or an instantiation.	An Outcome and Impact assessment framework is developed. It highlights guidelines for evaluators to follow to evaluate the key outcome and impact themes in ICT4D based on a comprehensive approach to evaluation.
Guideline 2: **Problem relevance**. DSR should produce technology based solutions to important and relevant business problems.	The assessment of ICT4D impact has gained strong interest over the years. However, ICT4D evaluation and more specifically outcome and impact assessments often overlook evaluating programmes across all appropriate domains of the evaluation lifecycle. An impact assessment of rural ICT4D should be informed by a comprehensive evaluation approach to holistically understand the effects of an ICT4D programme.
Guideline 3: **Design evaluation**. The utility, quality and efficacy of a design artefact should be rigorously demonstrated.	The selected method for evaluating the artefact is: **Observational: Case study** The designed artefact is evaluated through a naturalistic evaluation in the form of a case study (Pries-Heje, Baskerville and Venable, 2008; Venable, Pries-Heje and Baskerville, 2012). The designed artefact is used as a tool in

DSR Guideline	Application to Artefact Design
	two real ICT4D projects to evaluate the chosen projects' outcomes and impacts. A real evaluation problem is being addressed using real cases with real users. It therefore, provides a suitable environment to reflect on how the artefact works. Participant observation is part of the evaluation method employed, as the author is the primary evaluator using the artefact as a tool to evaluate two ICT4D programmes in South Africa (Pries-Heje, Baskerville and Venable, 2008; Venable, Pries-Heje and Baskerville, 2012).
Guideline 4: **Research contributions**. DSR should provide clear and verifiable contributions in the areas of the artefact itself, design foundations, and/or design methodologies.	The Design Science contribution of this research is the Outcome and Impact assessment framework proposed. The artefact itself provides guidelines for having a more holistic assessment on the effects of ICT4D programmes on beneficiaries. A more holistic outcome and impact assessment is needed as current assessment frameworks place emphasis on "impact" while overlooking other evaluation domains that are important for informing impact assessments. The proposed framework extends the ongoing research on the Rural ICT Comprehensive Evaluation Framework (RICT-CEF).
Guideline 5: **Research rigour**. DSR relies on the application of rigorous methods in the construction and evaluation of the design artefact.	Using Weick's theorising approach, a thematic analysis of nine existing impact assessment frameworks, from Social programmes, Information Systems/Information Technology programmes and ICT4D programmes, in search of the basic elements that are assessed across all impact frameworks is conducted. Furthermore, scrutiny from audiences at conferences and journal reviewers and participant observations aid in evaluating the artefact for improvement purposes. The framework's application in ICT4D environments yields lessons learned and adds value to the ICT4D knowledge base.
Guideline 6: **Design as a search process**. DSR utilises available means to reach desired ends in search of an effective artefact while satisfying laws in the problem environment.	The artefact relied on existing outcome and impact frameworks that inform ICT4D rural development. The proposed framework is then applied within the Siyakhula Living Lab case and the ICT4RED project in rural South Africa.

DSR Guideline	Application to Artefact Design
	Reflections from such an application aid in the revision of the framework.
Guideline 7: **Communication of research**. DSR should be presented effectively to technology-oriented and management-oriented audiences.	The artefact is described and its application is demonstrated in real ICT4D cases. The application of the framework results in Outcome and Impact assessment reports (Appendix E & G) tailored for the project stakeholders. Evaluation by target users in the selected rural ICT case studies provides guidelines and examples on how the artefact can be used. Moreover, the presentation of the framework at the ICT4D 2015 conference in Singapore and future publications on this research aids in further communication of the research.

Adapted from (Hevner et al., 2004)

2.2.3 Design Science Research Process

Peffers et al. (2006) propose a process for presenting and executing Design Science research. The process entails six steps: *Problem Identification and Motivation, Objectives of a Solution, Design and Development, Demonstration, Evaluation,* and *Communication*. Figure 2.3 presents the Design Science research process adopted in this research.

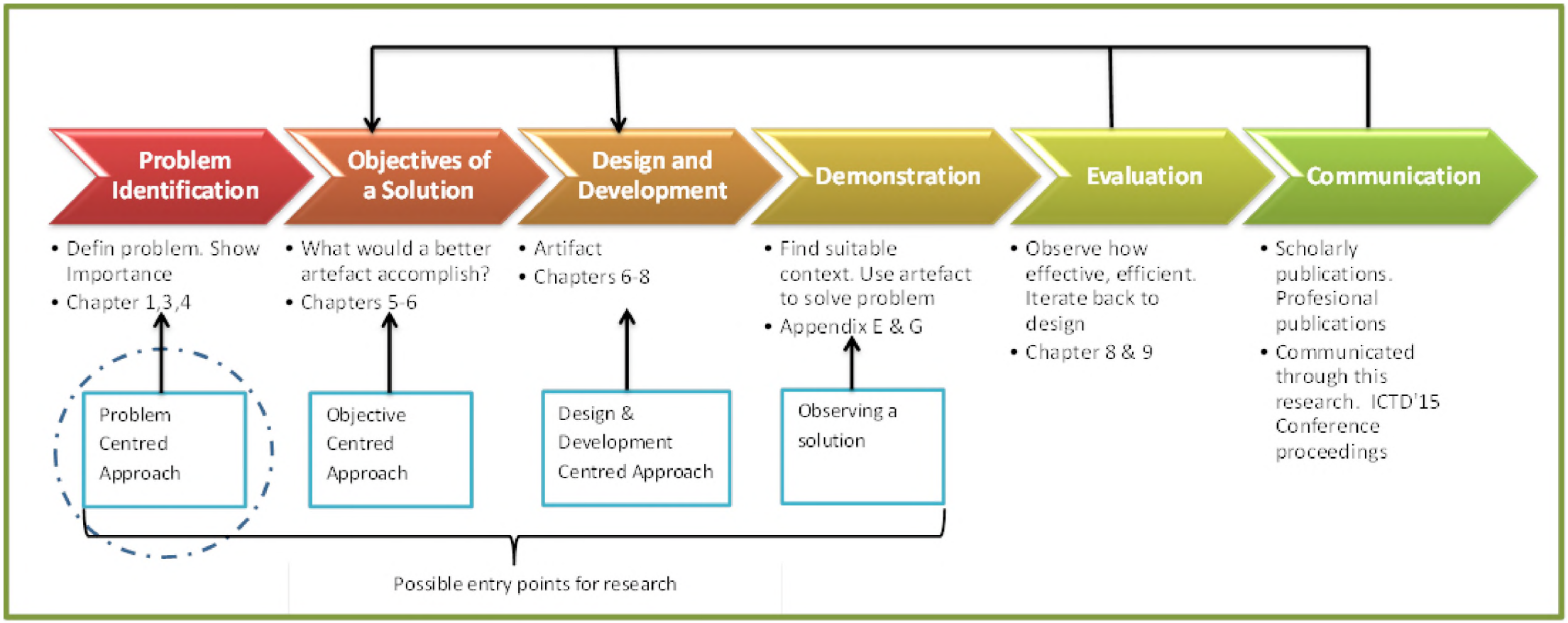


Figure 2. 3: Design Science Research Process

2.4 CONCLUSION

This chapter discussed the *research approach* that is applied in this research study. Design Science is the approach guiding the overall research process. Within this approach, the researcher aims to develop an Outcome and Impact assessment framework that forms part of a comprehensive approach to evaluation. As part of the framework development, the researcher applies and evaluates the proposed framework in a suitable real life environment. The chapter further details the overall research development process undertaken to answer the main research question.

Chapter 3: Rural Development

3.1. *INTRODUCTION*

3.2. *INFORMATION AND RURAL DEVELOPMENT*

3.3. *EVIDENCE OF RURAL DEVELOPMENT*

3.3.1. *The Multidimensional Nature of Development*

3.3.2. *Multidimensional Measures of Human Development and Poverty*

3.4. *CONCLUSION*

3.1. INTRODUCTION

Development is the pattern of positive economic, political and social change that takes place in a society (Gabriel, 1991: 8; Gasper, 2004: 28). It is a collection of goals that a society desires to achieve, which do not decrease over time. Such goals can range from economic growth and political freedom to health care and education. The most basic nature of development is to enable people to succeed and grow in various ways. On the whole, development indicates a change that is desirable; one that reveals potential (Singh, 2008: 2; McNamara, 2008: 31).

As developing countries go through rapid urbanization, the phenomenon of rural-urban migration continues to overwhelm developing countries (Rural-Urban Migration, 2010). Rural areas have been neglected in the past; as a result, their development has become a priority; however, rural development should not be at the expense of the urban sector (Abrahams, 2003; Epstein and Jezeph, 2001: 1443; Floridi, 2010: 108; Gabriel 1991: 8; International Fund for Agricultural Development, 2010; McNamara, 2003: 29; Ojo, 2007: 2; Rural-Urban Migration, 2010: 1). Rural development is seen as a strategy to improve the economic and social welfare of rural people (Bachmann, 2007: 17; Rural Development, 2010: 1). The Encyclopedia of Geography (Rural Development, 2010: 1) states that rural development is both a practical and intellectual effort. It involves the engagement of individuals, communities and nations as they work towards their desired goals and needs (Maxwell, Urey and Ashley, 2001: 5). More importantly, sustainable rural development is the development of people from rural areas in such a manner that their present needs are met without compromising the needs of the future (World Commission on Environment and Development, 1987).

Multiple methods and approaches to rural development have emerged over the years. Themes, such as stakeholder participation and awareness of the social, political, economic and environmental spheres, have become common when making rural development decisions (De Beer and Marais, 2005). However, there is no definite approach to development. No two rural areas are the same, therefore all development initiatives and approaches have to be tailored to suit a particular setting (De Beer and Marais, 2005). The approach that is followed is dependent upon the development context and the resources available, such as, the level of education and availability of infrastructure (Bachmann, 2007; De Beer and Marais, 2005). There have been various approaches that have been applied such as: “top-down” efforts that were directed at primary sector activities such as agriculture, fishing and mining (Rural Development, 2010: 1);

"bottom up" (regarding development as a whole), collaborative and participatory approaches (Bachmann, 2007; Krauss, 2009; Rural Development, 2010); community development approaches, which are highly favoured in South Africa (De Beer and Marais, 2005: 53; Flora, 1996: 2; Markey, Connelly and Roseland, 2010). Amartya Sen's Capability approach is an alternative framework for thinking about poverty and development. This approach focuses on individuals' capabilities of achieving what they value (Clark, 2005: 3, Sen, 2013). The capability approach views development as expanding people's freedoms. What an individual is free to do is known as their capabilities, whereas what an individual actually achieves, is known as their functionings. Within the capability approach there are five areas of freedoms to achieve (Heeks, 2009: 33; Sen, 2013):

- Economic
- Political
- Social
- Informational
- Security.

According to Sen (1999: 4), freedom is central to development, as:

- the assessment of development progress is done with reference to whether people's freedom has been enhanced.
- achieving development is dependent on the agency of people.

With development comes the need to measure the developmental progress made. Therefore, current views on the various indicators of rural development include poverty reduction, increased employment, increased equality and improvement in the quality of life of people. Given the multiple indicators for development, development should be viewed as a multi-dimensional process involving both economic and social change (Bachmann, 2007: 17; Gomez and Pather, 2012; Singh, 2008: 2).

The chapter first presents the discussion on the role of information in rural development. The evidence of rural development and the various measures available for determining the level of development of a community is then outlined. The chapter concludes that information, disseminated through ICTs, can play a role in facilitating poverty reduction and therefore, facilitate rural development.

3.2. EVIDENCE OF RURAL DEVELOPMENT

The past few years has seen improvement in many human development spheres. More people today are healthier, better educated and have greater access to goods and services. However, increasing inequality, and unsustainable production and consumption patterns have also been observed. There has been varied progress, and people in some areas such as Southern Africa have experienced periods of decline, especially in health (United Nations Development Programme, 2010: 1). To address these issues, new tools for development are required.

There has been a shift in the measurement of development outcomes. Trends towards including both non-economic and economic measures of progress are now being observed. Often the most common measure used for development progress is that of a monetary nature (Alkire, 2010; Melamed et al., 2012). In the 1960s, the focus was on the level of income presented in micro-economic indicators such as Gross National Product per capita (Alkire, 2010; Melamed et al., 2012). The focus then shifted towards broadening income poverty to the wider scope of basic needs. Rural development success goes beyond economic factors. The on-going improvement in the quality of life of rural people is a vital measurement for rural development success (Flora, 1996: 3). Poverty came to be known not only as income poverty but further included a lack of access to health, education and other services (Maxwell, 1999: 1; Oxford Poverty and Human Development Initiative, 2011).

There are multiple definitions for poverty, consequently there are numerous indicators proposed to monitor poverty. For example, one can examine income poverty or human development, sustainable livelihood or social inclusion, current consumption or future security (Maxwell, 1999). Although, different indicators have different uses, they all complement each other when measuring poverty (Maxwell, 1999: 1).

3.4.1. The Multidimensional Nature of Development

It is essential that governments not only focus on economic growth (which is only a means of expanding people's choices), but rather incorporate other performance measures, such as, infant mortality, inequality and unemployment. GDP and economic growth rates appear to be incomplete measures for people's wellbeing (Alkire, 2010: 9). GDP only computes transactions and ignores qualitative or distributive features. There has been a move to combine non-economic indicators with income indicators, as a means of measuring development

progress, which has come to be known as the "human development approach" (Alkire, 2010: 9; Melamed et al., 2012: 5). The objectives of human development are:

- Well-being: Enabling people to succeed
- Agency: Supporting people and empowering them to help themselves
- Justice: Expanding well-being and agency in such a manner that equity is improved, human rights are respected, environmental destruction is limited and other societal goals are respected.

Given the above objectives, human development seeks to expand human capabilities and empower people to actively engage in the development process (Alkire, 2010: 39). Human development aims to achieve this in ways that appropriately improve equity, efficiency, sustainability and other principles. Human development takes into account that the cohesion between social, political and economic events is important for effective development policy (Alkire, 2010). Poverty is one measure of the negative social well-being of a society. A reduction in poverty is often an indicator of improving human development (Fosu and Mwabu, 2010). However, measuring poverty does not equate to understanding the effects of poverty. Poverty interventions need to take into account why poverty occurs and not focus solely on the symptoms (Maxwell, 1999).

It is becoming clear that the rural poor define economic poverty as asset poverty. People value accomplishments, which are often not fully represented in high income and growth figures: for example, livelihoods, health, relationships, safety, culture, happiness, empowerment and political freedoms. The ultimate success of human development is determined by the capabilities that people value (Alkire, 2010; Sen, 1999; 2013). Despite these findings, economic analyses of poverty focus heavily on income. This could be attributed to the fact that it is easier to express income as a single unit rather than measuring the various assets owned by a household (Melamed et al., 2012). In order to capture the diverse nature of poverty within a country, agencies would need to employ various means of collecting a wide range of data from all possible sources, which at times is not feasible (Herrero et al., 2010).

3.4.2. Multidimensional Measures of Human Development and Poverty

Economic development is commodity-focused, whereas human development is people-centred. As commodities are tools for improving one's standard of living and well-being, economic development and human development are interrelated and societies should pursue

both these measures (Fosu and Mwabu, 2010). Having one dimension to measure and evaluate development is a weak approach. Whereas, creating multidimensional indicators that take into account more aspects of human welfare and economic growth would be an improvement for analysing development. The only problem with a multidimensional approach would be the process of constructing such a measure. For example, what dimensions of development would be included and how will these dimensions be approximated by specific variables (Herrero et al., 2010).

The human development index (HDI) was proposed by the UN to measure the degree of development of a country, based on Amartya Sen's idea of capabilities. Despite the improved means of measuring development, the HDI has come to have some criticisms, which include, but are not limited to (Herrero et al., 2010):

- *The number and the nature of the dimension*: There are relevant aspects to development that have not been incorporated, such as, social integration and sustainability.
- *The variables chosen to measure those dimensions*: Although this depends heavily on the availability of data, it is not clear that the variables chosen to measure health, education and material well-being are the most efficient.
- *The disregard for distribution issues*: The level of human development should account for how development is distributed and not only the level of development.
- *The nature of the three (health, education, and well-being) variables used*: The three variables makes it difficult to interpret the HDI as an aggregate value.

There are a variety of ways to improve the HDI and its indicators, in order to provide a more comprehensive view of the level of development for a society. For example, one option is to add new dimensions related to sustainability of the society, availability of infrastructure, the presence of social conflict, the degree of social integration, and the basic rights of human beings. It should be noted that the data required for these added dimensions are not always available and consequently requires long-term work (Herrero et al., 2010).

An alternative measure for development progress is measuring through the Multidimensional Poverty Index (MPI). The MPI is an international index for measuring poverty over 109 developing countries. The MPI complements income poverty measures. The index shows the various deprivations that face a person with respect to education, health and standard of living, which all complement income poverty. The MPI shows great progress in measuring poverty

on an international scale. It assesses poverty at the individual level and makes use of 10 indicators across these three dimensions which mirror those for human development. The ten indicators used include (Alkire and Santos, 2010; Oxford Poverty and Human Development Initiative, 2011):

- **Health**
  - Nutrition: deprived if any child or adult is malnourished regardless of the availability of nutritional information. In the MPI all members of a household are considered malnourished if at least one member is undernourished.
  - Child mortality**:** deprived if any child has died in the family.
- **Education**
  - Years of schooling: deprived if no member of the household has completed five years of school. Although, years of schooling is an imperfect measure of the quality of education, information on the level of knowledge and skills acquired at school is widely available and is the closest feasible approximation to the level of education in a household.
  - School Attendance**:** deprived if any school-aged child is not attending school in years 1 to 8. Although, school attendance does not take into account if a child has completed school or the quality of schooling they have obtained, it does indicate whether children are exposed to a learning environment.
- **Standard of living**
  - Cooking fuel: deprived if the household cooks with wood, charcoal or dung.
  - Sanitation: deprived if a household does not have adequate sanitation or have a shared toilet.
  - Water: deprived if the household lacks access to clean drinking water or clean water takes more than a 30 minute walk to collect.
  - Electricity: deprived if the household has no electricity.
  - Floor: deprived if the household has a dirt, sand or dung floor.
  - Assets: deprived if the household does not own more than one of: radio, TV, telephone, bike, or refrigerator and does not own a car or tractor.

The MPI reflects how intense poverty is across the three mentioned dimensions of poverty. For example, a person who is deprived in 80% of the 10 indicators is worse off than someone who is only deprived in 30% of the indicators (Alkire and Santos, 2010; Oxford Poverty and Human Development Initiative, 2011). Although the standard of living indicators are only means and are not direct measures of functioning/capability, they are closely related to the ends they aim to facilitate. Having the ability to determine the poverty level faced by an individual is essential for effective human development.

Due to data constraints, the dimensions for MPI had to be limited. For example, there is insufficient data on empowerment, yet empowerment should be included in a human development based poverty measure. Other dimensions of poverty, such as, work and safety could be incorporated in the future once data is made available. As the MPI is an index for acute poverty, developing countries at a higher stage of development would require a modified form of the MPI (Alkire and Santos, 2010). It would possibly include indicators on education quality, empowerment, and using higher measures for standard of living variables.

3.3. CONCLUSION

Rural development is a process leading to "sustainable improvement in the quality of life of rural people" (Singh 2008: 3). Rural areas are characterised by poverty that is more widespread than that of urban areas and require attention to alleviate such poverty (Epstein and Jezeph, 2001; Floridi, 2010; Gabriel 1991; McNamara, 2003; Ojo, 2007). As rural communities are all faced with a myriad of challenges, each community requires a developmental approach that is suited for that particular community. Therefore, various methods have been formulated for effective rural development. These varied approaches to rural development require multiple indicators for its measurement, which often leads to complexity. Information and knowledge are key components which aid in achieving development goals. As a result, there have been ways in which Information and Communication Technologies (ICTs), as tools, could foster rural development (McNamara 2003: 38; Fraser 1997).

Chapter 4: ICTs for Rural Development

4.1. *Introduction*

4.2. *Information and Rural development*

4.3. *ICTs and development*

4.4. *Translating Knowledge of ICTs into Usage within Rural Communities*

4.5. *Uses of ICTs in Rural Development*

4.6. *Challenges of Implementing ICTs in Rural Communities*

4.7. *Failure of ICT4D Projects*

4.8. *Ethics and ICT Failures*

4.8.1. Development ethics and ICT4D

4.8.2. IT Ethics and ICT4D

4.9. *CONCLUSION*

4.1. INTRODUCTION

E-Development, which is the use of Information and Communication Technologies (ICTs) to foster development, has become a widespread topic (Heeks 2002; Hosman and Fife, 2008; McNamara, 2003; Pade, Mallinson and Sewry, 2008; Unwin, 2009; Viitanen, 2005; Zaied, 2008). Numerous donors, individuals and organisations are drawn to e-Development due to financial gains, marketing purposes and recognition, or the hope that ICTs are the gateway to alleviating poverty and developmental challenges. Multinational firms have also recognised the economic potential of investing in ICTs in developing countries (Hosman and Fife, 2008). From a business perspective, improved access to the Internet may lead to increased productivity and a change in business processes, especially for developing firms who wish to compete in international markets (Mansell, 2004). As a result, there has been a rapid spread in e-development activity (Heeks, 2005; Toyama, 2011; Fuchs, 2013). ICTs can be defined as 'electronic means of capturing, processing, storing and communicating information' (Heeks, 1999). They can be referred to as the hardware, software, and contents of communication media, communication technology and information technology. Therefore, radio, Internet, print media, mobile phones, television, computers and community telecentres can all be regarded as part of ICT (Etta and Parvyn-Wamahiu, 2003: 2; Hassan and Ghanbari, 2010: 31).

Information and communication technologies (ICTs) are recognised as tools for poverty reduction (Hosman and Fife, 2008; McNamara, 2003; Pade, Mallinson and Sewry, 2008; Zaied, 2008). ICTs not only provide information and communication means to the poor but also transmit knowledge and information from the poor to the broader community (Heeks, 2002; McNamara, 2003). However, before ICTs can be utilised as tools for development, one needs to assess the various development challenges facing a country and then analyse where and how ICTs could impact those challenges in a sustainable manner (McNamara, 2003).

This chapter aims to provide contextual background to the field of ICT4D. The chapter first outlines the role that information and ICTs play in development. This is then followed by the process of translating knowledge into action uses and challenges of implementing ICTs in rural communities. The various factors that lead to ICT4D project failure are then discussed. Consequently, the ethical implications of ICTs is described. The chapter concludes that the review of ICT4D projects is important for rural development.

4.2. INFORMATION AND RURAL DEVELOPMENT

Sir William Arthur Lewis (cited in Capurro 2008) states that an essential cure for poverty is knowledge and not money. Unwin (2009) interprets knowledge as information that has been incorporated into one's understanding and action. As the world moves more towards digital mediums of information sharing, those who are unable to access this information are increasingly becoming marginalised (Unwin, 2009). There are a number of attributes that make information a suitable development resource. These attributes are listed below (Meyer, 2005: 6):

- *Dynamic force.* Information is not static and adds value by fostering innovation and change.
- *Extends the knowledge base.* Information, through training helps people expand their horizons, and enhance their competencies, their self-esteem, their perceptions and their sense of perspective.
- *Versatile.* Information comes in various forms and takes on a different value in the context of different situations.
- *Enhances growth.* The impact of technology and its hidden information component contributes significantly to agriculture, resource conservation, improved health, improved food security and overall economic growth.
- *Multiplicative.* Information is not lost when it is shared with others. Sharing information often increases it.

Information use is directly linked to various activities such as planning, decision making, and capacity building. There are a number of ways in which information benefits the lives of people through various development sectors, such as (Ashley and Maxwell, 2001; Hoq, 2012):

- *Agriculture*
- *Health*
- *Legal and human rights*
- *Education*
- *Markets and finance*
- *Employment*
- *Disaster management*

Information and knowledge are key components which aid in learning, decision making and fulfilling the decisions made in order to achieve development goals (Heeks, 2002). Therefore, information and Communication Technologies (ICTs) can contribute to the goal of sharing knowledge in Africa and other developing countries (Capurro 2008).

4.3. ICTS AND DEVELOPMENT

ICTs are a platform for exchanging data, information, and knowledge and are tools for implementing e-commerce, e-learning and e-health applications. The capacity of ICTs to enable global and efficient exchange of information and knowledge presents vast opportunities to address the information, knowledge and communication aspects of poverty and slow growth (McNamara, 2003). Ideally ICTs enable rural communities to form a part of mainstream developmental activities. However, this becomes more effective when emphasis is placed on providing income-generating opportunities to the poor as part of the wider development process (Epstein and Jezeph, 2001).

The history of ICTs and development has transformed from 'ICT4D 0.0' to 'ICT4D 2.0'. There has been a shift in the manner in which ICT4D initiatives have been designed, implemented and how they can have a sustainable impact on the poor and the developing world. Heeks (2009: 2) notes that the emergence of ICT4D stems from three main areas (Heeks, 2009: 2):

- The Moral Argument: Applying new technology to well established organisations and wealthy individuals with the aim of increasing productivity and/or efficiency in an already saturated market does pose ethical questions. The poor are the most affected by the world's problems; whether it is climate change, poverty, conflict and terror, disease and resource depletion. As a result, we are left with the ethical dilemma whether to invest in the wealthy or the poor.
- Enlightened Self-Interest: Living in a globalised world the spread of problems (through disease epidemics, migration and terrorism) faced by the poor to the wealthy is common. Alternatively, as the poor become better off they purchase more goods from the industrialised nations ensuring that everyone benefits from poverty reduction.
- Personal Self-Interest: Creating systems for developing nations appears to offer a much more rewarding and fulfilling experience, as compared to creating systems for the developed world.

Trends in ICT4D from ICT4D 0.0 to ICT4D 2.0 began with a focus on the public sector and its administration. During the period of ICT4D 1.0 development actors were pressured into delivering quick and tangible solutions that could be delivered in poor communities. ICT4D 1.0 took on an "invention down approach", where the focus was on the technology and delivering new IT solutions to developing communities. This method was used more than the "use-up approach" which aims to understand how technologies are currently being used in poor communities (Heeks, 2009: 5). However, such approaches have been inadequate. Projects have failed and consequently popular catchphrases such as 'sustainability', 'scalability' and 'evaluation' have emerged (Heeks, 2009: 4).

4.3.1. The Information Chain

The use of ICTs for digital data processing and digital data communication are the leading contributions that ICTs make towards development (Heeks, 2002: 2; McNamara, 2003: 28). The significant outcomes of such contributions are learning, decision making and action, which lead to the transformation of information into knowledge (Heeks, 2002: 2). In order to understand the role ICTs play one would need to understand the information chain and the role that information plays as a contributing factor towards development (Heeks, 2005: 2). The information chain (Figure 4.1) can be used as a means of evaluating the effectiveness of ICT4D programmes. ICT4D initiatives should consequently be designed with the information chain in mind.

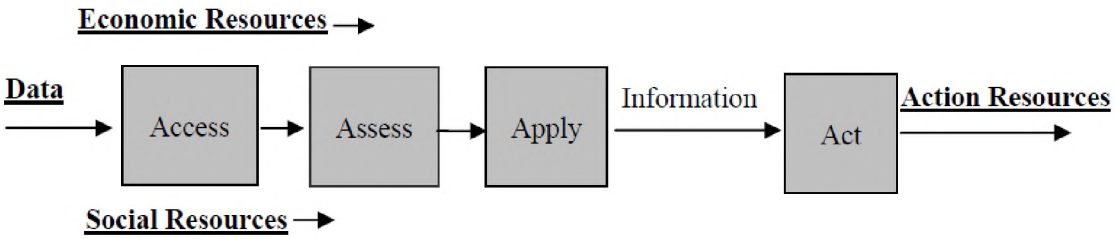


Figure 4.1: The Information Chain

(Adapted from Heeks, 2005)

The information chain begins with raw data which comprises unprocessed facts. According to the chain, one should be able to access the data, assess it and apply it when making some form of decision. The final stage of the information chain comprises a form of action whereby the information is acted upon before it can make any form of contribution towards development. For the chain to operate successfully four resources types are required (Heeks, 2005: 1):

- ***Data Resources***: relevant data needs to be available.
- ***Economic Resources***: Money, appropriate skills and appropriate technology is required to access the data.
- ***Social Resources***: Actors need motivation, confidence and knowledge to access, assess and apply the data from a reliable source.
- ***Action Resources***: Actors must be able to act on the decisions made with the information. This will require resources such as money, technology, raw materials, skills and empowerment (Heeks, 2005: 1).

The information chain suggests that ICTs may benefit only those who already have access to ICTs at the expense of those without (Heeks, 2002; Hilty and Hercheui, 2010). As a result, it is assumed that ICTs can mitigate such poverty traps by addressing the obstacles that create them (McNamara, 2003; Guitton, 2011; Hilty and Hercheui, 2010).

4.4. TRANSLATING KNOWLEDGE OF ICTS INTO USAGE WITHIN RURAL COMMUNITIES

The process of translating knowledge into practice takes on a three-stage process starting with awareness then acceptance and the last stage adoption (Pfeffer and Sutton, 2000: 7). As indicated in the Information Chain, one not only has to have access to information and knowledge, but one should also apply and use that information and knowledge (Heeks, 2005). The process of translating knowledge into use ensures that adoption and application occurs. The successful use of ICTs is made possible by four important elements proposed by Hassan and Ghanbari (2010). These elements include ICT hardware such as radio, internet, television; suitable access to media content; commitment by all stakeholders in providing adequate information, knowledge, learning opportunities; and the desire of the public to acquire information and knowledge as part of their daily activities (Hassan and Ghanbari, 2010).

The progression from awareness through to adoption can be achieved by diminishing the "knowing-doing" gap. This is the gap that exists between what is known, what is implemented, and what is put into practice as part of the learning process. A set of guidelines that will aid in minimising the "knowing-doing" are highlighted below. These guidelines also speak to the need to conduct evaluations overtime and more holistically:

- *Knowing the 'why' factor before knowing 'how'*

Often project teams and organisations want to know "how" with regards to practices and behaviour rather than understanding "why" with regard to a general guide for action (Pfeffer and Sutton, 2000: 7). Understanding the "why" will aid in determining if there is an actual need for a particular development project; with that comes an understanding of the community wants and needs as well. It will also further aid in the process of implementing the project as there will be a clearer understanding of where and how the project will suit a particular environment (Pfeffer and Sutton, 2000: 7).

A primary focus for ICT4D project implementation should be the design of projects with community needs and wants in mind (Hosman and Fife, 2008: 56). As a result, a bottom-up approach to reveal the needs of the community is far more successful than a top-down approach (Hosman and Fife, 2008: 59). It is important to understand the knowledge and information flows that people from rural areas possess and their way of living before ICTs can be fully utilised (Hosman and Fife, 2008: 66; McNamara, 2003: 42; Nikolidakis, 2006). It is also important to determine in collaboration with the local community, what their priority needs are for information and knowledge. New information and knowledge needs should be in a form that takes into account the available local resources and the current inequalities that already exist within a community (McNamara, 2003: 43, Heeks, 1999: 6; Wenn, 2008: 2). It should, however, be noted that some top-down approaches are beneficial in cases whereby community members are not aware of the essential approaches/means to support their development process.

- *Knowledge comes from doing and teaching others how*

  Learning is best achieved through a process of continual doing, from what is successful and unsuccessful, and reflecting on what is learned (Pfeffer and Sutton, 2000: 7).

- *Action carries more weight than effective plans and concepts*

  The learning process is made difficult and becomes less efficient if it is not established with real experiences. "The idea of firing and then aiming helps to establish a cultural tone that talk and analysis without action are unacceptable" (Pfeffer and Sutton, 2000: 7).

- *There is no doing without mistakes*

  All learning involves some level of failure. Fostering a culture of action also implies taking into account what should be done once things go wrong. Even effective plans risk failure (Pfeffer and Sutton, 2000: 7).

- *Drive out fear as it facilitates knowing-doing gaps*

  Fear normally starts and stops with the top (management). Top management should not inspire fear but instead should drive fear out. Fear cripples people as they will not be motivated to try something new. Initiatives that succeed in converting knowledge into action are often characterised by leadership and management that inspires respect and admiration but not fear (Pfeffer and Sutton, 2000: 7).

- *Collaborate, cooperate, share and fight the competition.*

  The success of projects depends on the planning stages of the project, acknowledging residents as stakeholders and creating partnerships (Hosman and Fife, 2008: 52; Huggins and Izushi, 2002: 115; Pade, Mallinson and Sewry 2008: 13; Silvius, Sheombar and Smit, 2009: 2). Cooperation and participation should be taken as a positive initiative through sharing a common goal (Pade, Mallinson and Sewry 2008: 13; Pfeffer and Sutton, 2000: 7). Moreover, the successful implementation of ICT projects is dependent upon stakeholder participation, design participation and the incentives that are put in place to contribute towards ICT4D projects (Rahul and Subrahmanian, 2006, cited in Guitton, 2011: 11). It is interesting to note that there are some shortfalls to community participation when it comes to the design of projects. For example, who among the community members participates? Often a small minority group participates in the decision making process. Furthermore, issues such as, how members participate (the way individuals participate is often different from the way members participate in a group); how community members participate and why they do not participate, need to be taken into account as well when trying to engage community members within a development project (Heeks, 2009: 14).

- *Measure what is important and what can help turn knowledge into action.*

  What gets measured does not necessarily equate to what gets done. Measurement often shows what has happened and rarely provides information that will help understand the results or understand what the future holds. Measures that are directly related to the basic business model are preferred to multiple measures that lack focus and do not indicate what is important. Therefore, processes should also be measured rather than merely measuring the outcomes of an initiative. A more comprehensive evaluation, that includes assessing all stages of ICT4D programmes, aids in understanding the past events within the project and the way forward (Pfeffer and Sutton, 2000: 7).

- *What leaders do, how they spend their time, and how resources are allocated and spent matters.*

  Leaders of organisations, institutions, and various programmes should realise that their task involves creating systems that facilitate the transfer of knowledge into action in a reliable manner (Pfeffer and Sutton, 2000: 7).

4.5. USES OF ICTS IN RURAL DEVELOPMENT

The process of creating knowledge societies as accelerators of development is enabled through ICTs. Much debate has sprung around ICTs and development; optimists associate ICTs with wealth creation and service quality improvement, while pessimists associate ICTs with unemployment and digital divide perpetuation (Heeks, 2002: 4). Some people view that it is the features of the technology itself which determine the impact that ICTs will have. While others view that it is the human choices which determine the impact of introducing ICTs into a community (Heeks, 2002: 4). As ICTs do not serve all societies equally as a tool for development (Avgerou, 1998), critics question whether ICTs bridge the digital divide or create more dependence on developed countries (Wenn, 2008: v). Such critics argue that ICTs only widen the economic, social and political gap between the rich and the poor, and the developed and the developing regions (Ojo, 2007: 2). Moreover, critics argue that ICTs have the potential to reinforce unsustainable structures and behaviour (Hilty and Hercheui, 2010: 228; Mansell, 1999).

The value that ICTs add to sustainable development has often been debated. It is argued that government and individuals should rather focus on the educational opportunities, agriculture and health care divides (Ojo, 2007: 2). Developing countries are already faced with challenges to meet the basic needs of the poor and governments have limited funds, which cannot accommodate for initiatives which are not at the top of the development agenda. However, the basic needs of the poor and the use of technology are not mutually exclusive and should not be seen as opposing spheres (Hosman and Fife, 2008: 53; Avgerou, 1998; Etta and Parvyn-Wamahui, 2003: 2). Instead, ICTs should be utilised for sustainable solutions while minimising the negative effects. Therefore, there is a continued need for evaluation to inform the development of sustainable solutions.

ICTs enable change; they do not create it (Heeks, 2002: 5). Technology itself only provides individuals with new opportunities. However, the ways in which these opportunities are utilised

and the resulting impacts are dependent upon the political, economic, socio-cultural and institutional factors of an area (Heeks, 2002: 5; McNamara, 2003: 32; Ojo, 2007: 2, Toyama, 2011). Given the above, ICTs are a means of achieving development goals and are not the universal remedy to development and development challenges (Gomez and Pather, 2012; Heeks and Molla, 2009; Kozma, 2005). Increasing access to ICTs does not replace national policies for poverty reduction nor does it render other development strategies ineffective (McNamara, 2003: 30). Instead an integrative approach is required, which sees ICTs as a "means to an end" (Heeks, 2002: 6). An integrative approach has three steps for a development project (Heeks, 2002: 6):

1. Identifying the objectives of the development project.
2. Identifying the new information requirements needed to achieve those objectives.
3. Identifying the role that ICTs have to play to meet those information requirements.

Using these steps, ICTs can be integrated into a project using development objectives rather than technological objectives. However, it should be noted that the integrated approach has its shortcomings. Taking ICTs only as tools that facilitate individual development goals may neglect their role as cross-cutting and linking technology. This reduces the diffusion of ICT knowledge and risks "reinventing wheels" (Heeks, 2009: 26). Three areas in which ICTs have had significant impact in rural areas are banking, agriculture and health. Avenues where ICTs have been utilised include:

- ICTs and service development
  (Batchelor, Evangelista, Heam, Peirce, Sugden and Webb, 2003; Hosman and Fife, 2008: 55; Mansell, 1999; McNamara 2003: Livingstone and Helsper, 2007: 672).
- ICTs and education
  (Guitton, 2011: 5; Matodzi, 2006; Nikolidakis, 2006)
- ICTs and banking
  (Corbett, 2008; Guitton, 2011; Sahlfeld, 2007)
- ICTs and agriculture
  (Batchelor et al., 2003; Corbett, 2008; Guitton, 2011).
- ICTs and health

(Corbett, 2008).

4.6. CHALLENGES OF IMPLEMENTING ICTS IN RURAL COMMUNITIES

Many ICT projects fail to have a significant impact as emphasis has been placed on the technology itself rather than understanding the relationship between ICTs and development (Heeks, 2005; Toyama, 2011). As a result these projects only aid in providing access to information which still needs to be assessed and applied, as detailed in the information chain discussed previously. Furthermore, ICT projects have often been implemented according to western techniques and in isolation to the broader economic, cultural, political and social changes taking place in developing countries (McNamara, 2003; Ojo, 2007; Sahlfeld, 2007). The concerns often lie with how and when ICTs will be implemented instead of looking at the why, who, under what conditions and the implications involved (Ojo, 2007). There are various social, technological and economic constraints to providing access to ICTs. The common ICT4D challenges are listed below:

- *Language Barriers* (Sahlfeld, 2007; Pade, Mallinson and Sewry 2008).
- *Infrastructure and Limited Skills* (Corbett, 2008; Hassan and Ghanbari, 2010; Heeks, 1999; Guitton, 2011; Molla, 2000; Wenn, 2008).
- *High Cost* (Matodzi, 2006; Guitton, 2011; Molla, 2000).
- *Social Cultural Barriers* (Krauss, 2009).
- *Community Resistance* (Hilty and Hercheui, 2010; Pade, Mallinson and Sewry 2008; Matodzi 2006; Unwin, 2009: 40)

4.7. FAILURE OF ICT4D PROJECTS

A common drawback with ICTs is the assumption that ICTs are the cure to development problems. Often ICT projects are implemented in isolation whereby developers and implementers do not ask questions with regards to the social, economic, cultural and political contexts in which development will occur (McNamara, 2003; Ojo, 2007; Pade, Mallinson and Sewry, 2008). The concerns often lie with how and when ICTs will be implemented, instead of looking at 'who', 'under what conditions', the implications involved and 'why' ICTs should be implemented (Ojo, 2007; Pfeffer and Sutton, 2000). For developing countries ICTs may make development more efficient; however, ICTs are not the only tool for development (Sahlfeld, 2007: 22). Some of the failures of ICT4D to date include:

- *Failure to involve beneficiaries and users*

  Incorporating the beneficiaries and users of a system within the design phases can address the issues with regards to the design reality gap. The project would be better suited to the local conditions in which it is implemented and relevant to the local context. Beneficiaries and users can contribute their knowledge of the local context into the design of the system. This will assist in reducing the design-reality gap and also aid in identifying and overcoming challenges that may arise in the future. Involvement in a project also creates a sense of ownership within the project which facilitates the likelihood of sustainability (Breytenbach, De Viliers and Jordaan, 2013; Krauss, 2009; Walsham, 2010). Lastly, appropriate local content is necessary to ensure a trend of continued use of the technology (Krauss, 2009; Walton and Heeks, 2011). Engaging all stakeholders is important for problem analysis, mobilising resources, and monitoring and evaluation of projects. A culture of engagement will also encourage empowerment and the transfer of knowledge (Breytenbach, De Viliers and Jordaan, 2013; Krauss, 2009; Patton, 1997; 2013).

- *Making use of a rigid delivery approach*

  Often ICT4D projects are designed around a structured approach. Time is better spent on adapting to changing environments rather than focusing on a rigid plan of action over the course of a project. Projects should create dynamic approaches, whereby the project design is flexible and adaptive to emerging change. This will allow the design to evolve beyond the initial outputs planned over time (Walton and Heeks, 2011). Development programmes should begin small and adapt their initiatives based on experimentation and the feedback provided (Walton and Heeks, 2011). Furthermore, ensuring that there is sufficient infrastructure such as reliable electricity and adequate internet connectivity is important (Nikolidakis, 2006; Hosman and Fife, 2008).

- *Failing to learn from past mistakes*

  Typical top-down approaches of implementing ICT4D respond to errors either by denying failure, externalising failure or embracing failure. Without acknowledging local values and traditions, ICT4D systems risk failure. Embracing failure is a component of learning organisations, which requires a different approach to that of top-down initiatives. ICT4D should take on a learning approach that continues to learn from the environment in which they are placed to facilitate ongoing adaptation (Avgerou, 2008; Toyama, 2015; Walton and Heeks, 2011).

- *Neglecting to make use of local institutions*

  Projects should make use of local institutions to facilitate participation and improve local capacities. Failure to make use of local capacities or build local capacity may lead to unsustainable initiatives. Enabling local communities extends beyond participation in a project. Increased capacity of local institutions facilitates the generation of ideas from the poor (Best and Kumar, 2008; Breytenbach, De Viliers and Jordaan, 2013; Krauss, 2009; Walsham, 2010; Walton and Heeks, 2011).

- *Poor leadership*

  Participation, adaptability, learning, and encouragement of project stakeholders require effective management. Aspects of project failure can be attributed to poor project management skills. Effective management and leadership of the project team are necessary to drive the changes that are required for ensuring sustainability (Best and Kumar, 2008; Walton and Heeks, 2011). Maintaining good leadership ensures that qualified staff members are retained and an adaptive and learning environment is created whereby staff members are able to contribute their full expertise (Walton and Heeks, 2011). Furthermore, low bureaucracy is important to ensure easier project work (Nikolidakis, 2006; Hosman and Fife, 2008: 66).

- *Failure to create feasible ICT4D plans for implementation*

  ICT4D projects often fail due to a 'reality gap'. Some projects are designed in the developed world and implemented in developing countries. This often creates a 'design-reality' gap and results in project failure (Heeks, 2002; Hosman and Fife, 2008; Pade, Mallinson, and Sewry, 2008).

4.8. ETHICS AND ICT FAILURES

Appropriate technology is technology that is developed specifically to match the cultural and contextual elements of the community in which it is being implemented (Hosman and Fife, 2008: 55). As a result, the 'ethical and social impact that technology poses' has to be considered as well (Reijswoud cited in Guitton, 2011: 10; Pade, Mallinson and Sewry 2008: 14). Conducting ethical research in ICT4D should take into account the available dimensions of ethics. ICT4D research should draw on theories both from development studies and IT theory. Therefore, taking into account development ethics and IT ethics would inform the ethical practice of ICT4D programmes. Such a view would help identify ICT4D ethical concerns so

that the adoption and integration of ICTs is compatible with development programmes in developing countries (Gasper, 2004: 25).

4.8.1. Development ethics and ICT4D

As mentioned in the previous chapter, sustainable development is predominantly defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development, 1987: 8). According to Hilty and Hercheui (2010: 227), the above definition comprises two ethical claims:

- Firstly, meeting the needs of the present generation
- Secondly, not compromising the ability of future generations to meet their own needs

This is an ethical concern as extending the present consumption patterns of developed regions to the developing parts of the world, especially rural communities, can burden future generations (Hilty and Hercheui, 2010: 227). "Development is intensely ethically laden – who benefits or loses, with respect to whose values; who decides, who is consulted, who is not?" (Gasper 2009: 457). Development is only deemed to be sustainable within an environment of real partnerships which take into account the real imperatives of developing regions. Too often investments in projects aimed to support developing nations, favour the interests of those making the investments at the expense of those who benefit from such projects (Brunet, Tiemtoré, and Vettraino-Soulard, 2004: 4). Additionally, there are cases where development initiatives exploit new markets and establish new consumers of Western technologies rather than participators of development projects. Such actions 'equate to abuse of a community" (Krauss, 2009: 254). Ethics plays an important role in ICT for development projects. This is especially true when the very same technologies that are used as a means of narrowing the gap between the information rich and the information poor can also worsen existing digital divides (Floridi 2010: 108; Mansell, 2004: 1; McNamara 2003: 29). As a result there is concern for the importance of ethics in ICT4D practice.

4.8.2. IT Ethics and ICT4D

The growth of the Internet, the ability to store a large amount of information and the reliance on information systems has increased the risk that information technology will be used unethically (Reynolds, 2010: 6). Technology, in particular the Internet, raises ethical issues such as: increased inequity and exclusion; exposure to offensive content; high costs;

technological illiteracy and reinforcing monopolies at the expense of local Small to Medium Enterprises (SMEs) (Brunet, Tiemtoré and Vettraino-Soulard, 2004: 18; Basden, 2009: 2). The social impact of ICTs is greater than the impact other technologies have had. This is mainly attributable to the communication component of ICTs and humans being viewed as communicative beings (Gorniak-Kocikowska, 2007: 52). Technology influences the way people interact; it can shape institutions, the economy, and one's moral values (Capurro, 2008: 1167). ICTs used as tools for development need to take on a moral stance in order to integrate them effectively within society (Mthoko and Pade-Khene, 2013).

Due to the potential negative effects that ICTs have, the use and implementation of technology within developing countries needs independent and informed review especially at policy level (Thompson, 2008). All ICT4D programmes need to have clear and effective monitoring and evaluation strategies to ensure learning and effective documentation of the success and failures of such programmes (Unwin, 2009). Evaluation and impact assessment have often been side-lined. It is easier to move onto a new project rather than look back at the currently existing one. This has been partly due to a lack of motivation and guidance (Heeks, 2009). The high failure rate of ICT4D programmes has led to emphasis on the sustainability of ICT4D projects. However, if projects genuinely focus on meeting people's wants in effective and efficient ways then sustainability is assured as people will be willing to assist in funding such projects (Unwin, 2009).

4.9. CONCLUSION

ICTs give "voice to the poor; interconnect poor communities, and provide new opportunities for economic and social development" (Heeks, 2002: 9). However, this can only be achieved when ICTs are integrated with development objectives in mind (Heeks, 2002: 9). Furthermore, ICTs are not always associated with positive impacts, but are also associated with negative effects, such as, benefitting those who already have access to ICTs (Heeks, 2002: 3). Given the high interest and investment in ICT projects in developing nations, there have been challenges that have hampered the success of these projects (Heeks 2005: 11). Challenges of ICT4D are diverse and range from language barriers, limited infrastructure and skills, high costs, and social cultural barriers to community resistance. Many ICT4D initiatives have failed to produce positive results and impact a community in a sustainable way. As a result, a continuous review of the use and implementation of technology in rural communities is required.

Chapter 5: Monitoring and Evaluation of ICTs in Rural Development.

5.1. INTRODUCTION

5.2. MONITORING AND EVALUATION OF DEVELOPMENT PROGRAMMES

5.2.1. Why Monitor and Evaluate Development Programmes?

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5.4.1. Guidelines for improved impact evaluations

5.5. COMPREHENSIVE EVALUATION OF ICTS FOR RURAL COMMUNITIES

5.6. CONCLUSION

5.1. INTRODUCTION

Poverty is complex; as a result, rigorous assessment is required in order to understand the role ICTs play in poverty reduction (Batchelor and Norrish, 2006). There is a need to evaluate the impact of information and determine whether it is relevant, timely, understandable and practically beneficial to communities in rural areas (Khene, 2010). It is also considered standard good practice to evaluate ICT pilot projects throughout their planning, implementation and post implementation stages with the aim of gaining a more holistic understanding of the entire project and its effects on a community (Batchelor and Norrish, 2006: 7).

While it is well documented that ICTs act as tools for social change and development, there is limited empirical evidence to support this. There is still a shortage of in depth evaluation research (taking into account both quantitative and non-quantifiable measures) and many developmental questions remain unanswered (Gomez and Pather, 2012: 2; Marathe et al., 2015; O'Neil, 2002: 78; Tabassum and Yeo, 2015; Wagner, Day, James, Kozma, Miller and Unwin, 2005: 6). How ICTs facilitate development and why they have the effects they have are all important questions that should be reviewed for all projects. This shortage of evaluation research in the communication informatics realm is mainly attributed to the difficulties of measuring the social impacts of ICTs (O'Neil, 2002; Rogers, et al., 2011).

The following chapter explores the importance of evaluation and the monitoring and evaluating field of ICT4D programmes. The need for assessing the impacts of ICT4D programmes is then further discussed. The challenge of conducting such evaluations is outlined with the aim of identifying areas for improvement for future projects. A more comprehensive approach to evaluating ICT4D programmes is introduced. The final section of the chapter concludes that new modes of assessing the outcome and impact of ICT4D are required.

5.2. MONITORING AND EVALUATION OF DEVELOPMENT PROGRAMMES

Evaluation seeks to confirm the premise that a project will achieve its purpose if certain activities and outputs are completed (Batchelor and Norrish, 2006: 7). In order for development projects to make a positive contribution there needs to be evidence of success from a forward looking perspective (Batchelor and Norrish, 2006: 2). Monitoring is defined by the World Bank (2011) as

> *a continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an on-going development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds* (OECD, cited in The World Bank, 2011).

Therefore, monitoring requires keeping track of the inputs, activities, outputs, outcomes and impacts of development activities on a regular basis. Evaluation is then defined as

> *the process of determining the worth or significance of a development activity, policy or program ... to determine the relevance of objectives, the efficacy of design and implementation, the efficiency or resource use, and the sustainability of results. An evaluation should (enable) the incorporation of lessons learned into the decision-making process of both partner and donor* (OECD, cited in The World Bank, 2011).

Unlike monitoring, which has a management function to determine whether resources are sufficient, and whether activities conform to the work plans, evaluation is an assessment of a project/programme, its design, implementation and effects (Wieman et al., 2001: 4; World Bank, 2011). Monitoring and evaluation are interrelated. It is important to monitor information; however, it is not sufficient for conducting a rigorous evaluation. Reliance on monitoring information on its own only covers particular dimensions of a project's activities. This information also has to be used with care as it can lead to 'unintended behavioural incentives'. Evaluation on the other hand can provide a more balanced interpretation of performance. However, evaluation is more time consuming and entails much higher costs to conduct. One way of mitigating the costs is to rely on monitoring information to identify potential problem areas and then investigate these areas in more detail using evaluation (World Bank, 2011).

5.2.1. Why Monitor and Evaluate Development Programmes?

Development projects need to be evaluated to ensure that they are fulfilling their roles and effectively achieving their goals as stipulated in the initiation stages of the project (Batchelor and Norrish, 2006: 16; Khene, 2010: 39). Evaluation reveals how a project is performing and benefiting its participants, and in the event a project is not meeting its goals (both for beneficiaries and funders), project stakeholders can then take time to reflect and take corrective action.

Development initiatives need to be evaluated formatively to ensure they are working towards their intended purpose. At the same time project stakeholders need to learn from their project experience to discover whether the project has made a positive influence (Batchelor and Norrish, 2006: 16; Reilly and Gomez, 2001; O'Neil, 2002; Wagner et al., 2005; Wieman et al., 2001).

5.2.2. Why Monitor and Evaluate ICT4D Programmes

ICT4D project evaluation is necessary as it demonstrates the usefulness of ICTs complementing other developmental strategies for poverty alleviation and determines the links associated with other developmental objectives. Evaluation of ICT4D projects has often been that of a quantitative nature which does not indicate whether meaningful change has occurred in people's lives (Heeks and Molla, 2009). Given the numerous tools for evaluation there is still insufficient insight into the effective evaluation of ICT4D projects especially from a socio-economic development perspective (Gomez and Pather, 2012; Heeks and Molla, 2009: 2; O'Neil, 2002; Wagner et al., 2005). The difficulty often lies in the notion that not all social change can be measured using defined indicators (Heeks and Molla, 2009). Monitoring and evaluating ICT4D initiatives is important as it aids in (Batchelor and Norrish, 2006; Khene, 2010; Reilly and Gomez, 2001; Wieman et al., 2001):

1. *Reporting and awareness*
   (Department for International Development, 2005; Khene, 2010: 4; Mozelius, Hansson, Kahigi and Ekenberg, 2008; Rodriguez, Nussbaum, Lopez and Sepulveda, 2010).
2. *Scaling*
   (Batchelor and Norrish, 2006; Khene, 2010; Reilly and Gomez, 2001).
3. *Tracking project progress*
   (Batchelor and Norrish, 2006; Khene, 2010; Reilly and Gomez, 2001).
4. *Documenting lessons learned for future planning*
   (Batchelor and Norrish, 2006: 16; Khene, 2010: 27; Reilly and Gomez, 2001: 7).
5. *Mitigating future failures*
   (Batchelor and Norrish, 2006; Bamberger and Mackay, 2004; Khene, 2010; Reilly and Gomez, 2001; Wieman et al., 2001).

5.3. OUTCOME AND IMPACT ASSESSMENT OF ICT4D

As we live in a world of limited resources, it is important that ICT4D projects demonstrate their impact towards development through a process of assessment (Kreber, Brook and Educational Policy, 2001; Wagner et al., 2005: 20). ICT4D impact would be defined as "the change in the ability of people to satisfy their needs brought by the outcome of the use of information" (Khene, 2010: 26). Alternatively, the International Institute for Communication and Development define the impact of development as the socio-economic effects of a project on the individual end-users of the project (Wieman et al., 2001: 3). *Impact Assessment* of ICT4D aims to evaluate the long-term effects of a project on a target community and the wider society; whereas, *Outcome Assessment* aims to evaluate the immediate and direct resulting output of a project. Khene (2010: 26) defines outcome assessment as an assessment that "aims to measure a change in the state or social conditions of the targeted population which the ICT project is expected to change". For example, the outcome of introducing ICTs within a local school in a rural community would be the number of computers in each lab, access to information, the number of community members who have been trained and the type of skills they have been equipped with. On the other hand, the impact of such an intervention would then be the long-term effects of the project on the community long after the project has been implemented. The ability of school learners and teachers to effectively access useful information and use it to augment their teaching and learning would contribute to better performance at the school. The impact of the project would be a change in the performance of learners and a change in the teaching quality at the school.

The evaluation of impact is a good indicator of project effectiveness and whether the project was a good investment. All projects should keep a record of their progress, which should be revised and edited on a regular basis. Therefore, instead of evaluating projects entirely on predetermined goals, all outcomes and impacts should be identified and then decide whether these outcomes and impacts are desirable (Bailur, 2007; Kreber et al., 2001; Wagner, et al., 2005). Impact assessments focus on the long term effects of an initiative; therefore, it is associated with the sustainability of a project. Such long term effects aim to determine whether ICTs ultimately support rural development activities that will benefit the community in such a manner that can be expanded to other areas. Therefore, understanding the extent activities reach the poor and the effects they have on the welfare of the poor are key (Rogers, et al., 2011;

Wagner, et al., 2005). The impact of ICT4D should also assess whether such projects can build the capacity of the local community over the long term (Rogers, et al., 2011).

It is important to note that there are various dimensions of impact. Four distinctions (refer to Figure 5.1) need to be made when conducting the impact of a development project (Wieman, et al., 2001):

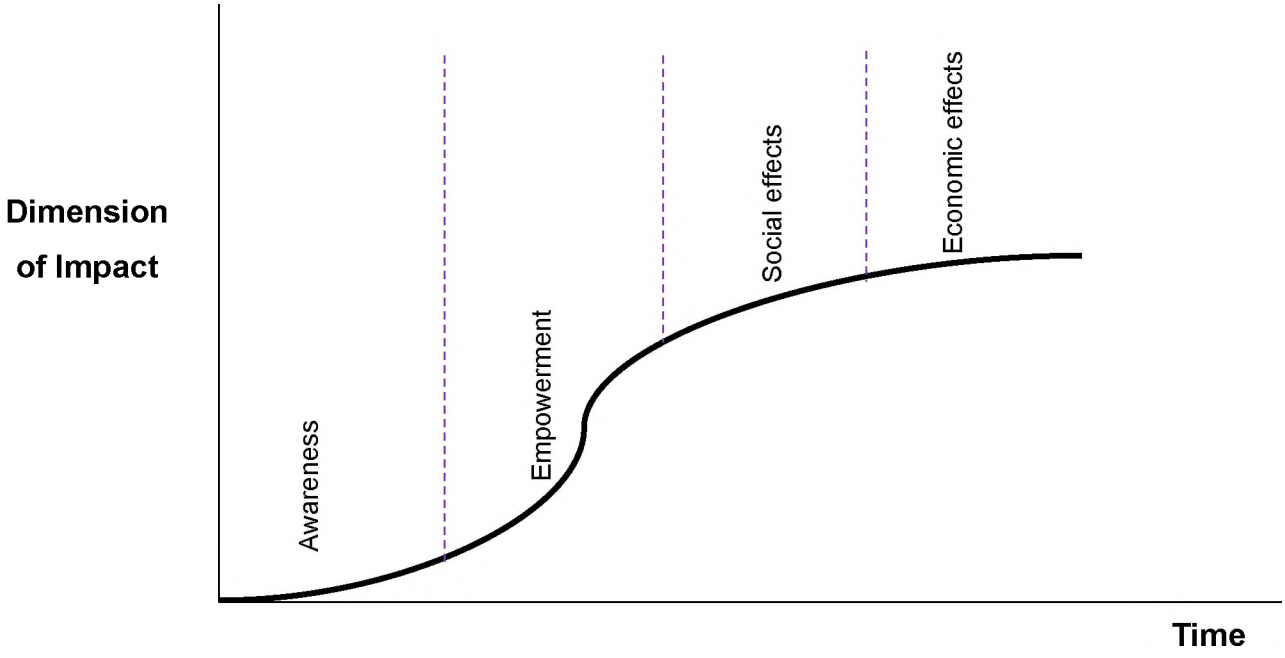


Figure 5. 1: Different dimensions of Impact for ICT projects

- *Awareness*

  Awareness is important as it is often seen as the first stage of project impact. It is the dimension where other actions, by the project beneficiaries, are likely to emanate. Awareness looks at the level at which the project has resulted in awareness of ICT opportunities.

- *Empowerment*

  Once one is aware of the opportunities presented by ICTs, one then can apply ICTs to their own situation. Empowerment looks at the level at which the user can actually apply ICTs in their own circumstances.

- *Social effects*

Social effects look at the level at which a project has led to differences in socio-cultural areas. In this case one measures which socio-cultural impacts have been influenced by awareness and empowerment.

- *Economic effects*

  Economic effects look at the level at which the project has led to differences in economic areas. In this case one measures the economic effects that have been contributed by awareness and empowerment. The reason for this is that economic or social impacts are less likely to be present without awareness and empowerment taking place.

Rural development projects have multiple goals and various dimensions. As it is not possible to assess every aspect pertaining to rural development, impact evaluation should produce comprehensive results. Rigorous impact also prevents wastage of scarce resources on ineffective projects. However, it can be argued that rigorous evaluations are better suited to academics rather than practitioners as they take too long to produce results, they redirect resources away from already successful programmes and they focus mainly on quantifiable outcomes (Clemens and Demombynes, 2010: 1). A rigorous impact evaluation requires that researchers show that the effects of a project truly represent the changes that came about because of the project (Clemens and Demombynes, 2010: 10). Therefore, it is important that evaluations occur overtime and inform long term impact evaluations. Many studies (Parkinson and Ramírez, 2006; Molla and Al-Jaghoub, 2007; Duncombe, 2006; Underwood et al., 2013; Ei Chew et al., 2013; Ahsan and Raihan, 2013; Tabassum and Yeo, 2015; Yafi et al., 2015; Marathe et al., 2015) conduct impact assessments in silos with minimal reference to preceding evaluation data in a project's lifecycle (from earlier stages of a project). Isolated impact evaluations are not as valuable as those that are integrated within a more comprehensive monitoring and evaluation system. Such a comprehensive system would strengthen its contribution towards development (Kreber et al., 2001; Rogers, et al., 2011).

5.4. CHALLENGES OF ICT4D PROJECT EVALUATION

Existing evaluations of ICT4D are faced with various challenges and shortcomings which influence the reliability of the evaluation results (Khene, 2010). Despite the large investment in ICTs, there is still insufficient insight into appropriate evaluation methods of ICTs for socio-economic development. There is limited rigorous evaluation being undertaken to identify the planned and the unplanned impacts of ICT4D initiatives overtime. Even in cases where ICTs

are found to be useful it still remains unclear which aspects of ICT4D are effective, how they can be improved and how these projects can be sustained (Rodriguez et al., 2010; Tacchi, Slater and Lewis, 2003). Increased access to ICTs does not guarantee increased meaningful use of ICTs and the evidence of the contribution that ICTs make towards social and economic development is also limited. The "true value of social development is not easy to conceptualize" (O'Neil, 2002: 77; Gomez and Pather, 2012: 6). The benefits and impacts of ICT are often elusive and intangible (Gomez and Pather, 2012: 1). ICT4D evaluation research has focused too often on measuring the tangible and quantifiable economic benefits to development. It focused on outputs such as the number of computers implemented, and the number of users etc. (Gomez and Pather, 2012; Rogers, et al., 2011). Therefore, intangible impacts, which are equally important for development, have often been neglected. Examples of intangible impacts that need to be evaluated include empowerment, self-esteem, and sense of self-worth, social cohesion and strengthening social fabric (Gomez and Pather, 2012).

As it is difficult to measure human behaviour and social processes, there are no ready-made ways for measuring the success of Information and Communication for Development (ICD) projects. Some challenges that can be faced when evaluating ICD programmes include but are not limited to the following (Clemens and Demombynes, 2010**;** Department for International Development, 2005; Gomez and Pather, 2012; O'Neil, 2002; Ramírez, 2011; Rodriguez et al., 2010; UNCTAD, 2011; Wagner et al., 2005):

1. *Theoretical framework*

   There are few case studies that are based on an existing theoretical evaluation framework about development. There often is no clear indication as to what aspects of a project should be evaluated rather than how the evaluation should take place. This makes the learning process difficult as evaluations appear to be conducted in an isolated manner. Integrated evaluations that form a part of an iterative and adaptive approach, which should be documented, are important. Such an approach creates synergies between project adjustments throughout the project and improvements made after periodic evaluations of the results.

2. *Target audiences and users*

   Difficulties determining a target audience in cases where a project has an effect on a wide area is common. A lack of participation from stakeholders also poses problems. It does not

reflect the true impact a project has on a community as only a partial viewpoint is taken into account. It is important to conduct a stakeholder analysis and differentiate between those views that should be collected and those views that are actually collected. A key starting point is determining who the evaluation is for and who will utilise the results. Engaging participants, aids in user buy-in, whereby user needs guide the balance between formative and summative evaluations. Furthermore, rural areas are characterised by a number of interrelated social and cultural factors that should be taken into account when analysing the evaluation audience.

3. *Evaluation goals*

   In the early stages of a project, confusion in methodology is common. A balance will be required between formative evaluations for learning purposes and summative evaluations for assessing impacts.

4. *Lack of causal relationship*

   Some challenges of ICT4D programmes include the non-causal relationship between the project changes that occur and the development programme itself. Evaluation of ICT4D becomes more complex as ICTs enable various developmental outcomes that are difficult to link from a cause and effect perspective. Growth in the national economy, changes in weather conditions and national information campaigns, are examples of factors that could have an effect on a community and might not be identified by a monitoring and evaluation team. It is important to reach an agreement with regards to causality. For example, empirical studies of ICT impact in education have shown that there is no direct consistent relationship between the availability and use of ICTs and student learning. Causality is only assured in controlled experiments. Furthermore, if external development interventions are taking place within a particular community it will not be possible to adjust for the evaluation, unless baseline data is available.

5. *Time constraints*

   It should be agreed what the dimensions for change will be throughout the life of a project. It is common for impact to become evident only after the project has terminated (more common for short projects). Furthermore, there are difficulties measuring change over a short period of time as impact often takes place overtime. Only long-term evaluations, that are conducted a number of years after a project has been introduced, can determine/assess

whether the positive effects of a project are sustainable or not. However, because project funders and government agencies require immediate results in order to determine whether their investments are in fact relevant, long term impacts are often taken lightly.

6. *Evaluation methods*

There is no set methodology that suits every situation. A range of methods to conduct evaluations need to be adapted to each context. Evaluations should be open to using a variety of methods that are suitable to the nature and context of the development programme being evaluated. For example:

- Using statistics to demonstrate the impact of ICT4D activity is not an easy task. ICTs are constantly changing overtime and they all have different impacts in different contexts
- Some impacts, such as, empowerment and good governance are subjective and difficult to place a value on.

Therefore, it is important to incorporate methods that do demonstrate the more qualitative impacts of ICT4D. However, this may pose a problem where project donors or funders prefer to observe the more measurable/quantitative impacts of the project. Project evaluators are often pressured to substantiate their results with quantitative data, which is not always possible (Reilly and Gomez, 2001).

7. *Social Impact Assessment*

The social impact assessment (SIA) of ICT4D has often been reduced to simple tools, techniques and checklists that are manipulated to obtain particular results (Howit, 2011: 79). Project implementers and governments prefer to justify development projects and preferred policies with narrow SIAs. Such narrow approaches appear to justify predetermined outcomes of a particular policy or project or claim to be neutral and objective in offering advice (Howit, 2011: 79). With ICT projects, the expected social outcomes as measured against the project objectives do not always reflect the true negative and positive impacts of the project. It is an ethical imperative to deliver all results including the negatives ones.

8. *Lack of funds*

Impact assessments can be costly and the additional information provided by such assessments does not always justify the extra cost incurred. However, the direct costs of making rigorous assessments are low. Furthermore, the overall cost of an evaluation

including an impact assessment would only constitute a small percentage of the entire cost of the project. Another common objection to rigorous evaluations is the process of using control sites where an intervention has not been implemented. This is considered unethical by some researchers to monitor communities that are also undergoing poverty. However, some projects do not have the necessary resources to intervene/implement development projects within every single community that is undergoing hardships.

5.4.1. Guidelines for improved impact evaluations

All ICT4D impact evaluations should work towards improving development. Such evaluations should draw from a variety of approaches that can be applied in various development contexts. Given the challenges for evaluating ICT4D projects, some recommendations for impact evaluation include (O'Neil, 2002; Reilly and Gomez, 2001; Rogers, et al., 2011):

- Ensuring the purpose of the evaluation is known in order to ask the right questions. Hence, the goals of the evaluation should be well stated. The evaluation should also be context sensitive and locally grounded.
- Stakeholders should actively participate in the evaluation design and implementation. Both users and non-users of a new development intervention should be involved in the evaluation process. Partaking in the evaluation process provides a sense of ownership and is more likely to be used by project beneficiaries. As community members are becoming recognised as active agents of development, it is expected that impact assessments should engage all actors who form part of the ICT4D programme and address their information needs. Not only should all stakeholders be involved in the evaluation process but such a process should also be socially inclusive.
- The choice of methodology for conducting the evaluation process should be appropriate to the context in which it is being applied. There should be a balance between the method being useful and the method being applicable in similar situations (replicability). There should also be a balance between the method being robust and being practical given the local context. Lastly, triangulation should also be used to validate findings and gain a more holistic project perspective.
- Impact evaluations should contribute towards making ICT4D initiatives sustainable and relevant. Evaluations should create opportunities for learning and build local capacity. Therefore, there is a need for evaluation overtime (throughout a project lifecycle) to

enhance learning. A reflection of both success and failures that are documented should aim to empower ICT users and practitioners.

- Researchers should act in accordance to ethical standards and comply with human subject regulations when carrying out development evaluations. Impact evaluations should be conducted based on a shared vision of the evaluation purpose, process and how the results will be used.
- Impact evaluations should be made public in an appropriate manner.
- The evaluation process should be integrated into the project design and should reflect the project objectives. The evaluation questions should be clear and important to stakeholders. However, because impact evaluations seek to uncover both anticipated and unanticipated impacts, it could uncover impacts that are not desirable to stakeholders.

In summary ICT4D evaluations should aim to be participatory; socially inclusive; locally grounded; public and transparent; methodologically appropriate; sustainability enhancing; capacity building; reflective of shared vision; strategically oriented; and gender sensitive.

5.5. COMPREHENSIVE EVALUATION OF ICTS FOR RURAL COMMUNITIES

The challenges faced by existing ICT4D evaluations have highlighted the need for a more comprehensive evaluation that is sensitive to the rural environment. The evaluation of ICT4D should be comprehensive to effectively capture the impact of ICTs in rural communities. A comprehensive evaluation would be based on the evaluation of preceding stages of the project lifecycle. The evaluation of the readiness, availability, uptake, process and impact of ICT4D are all equally important domains of evaluation. These evaluation domains are based on the Rural ICT Comprehensive Evaluation Framework (RICT-CEF) and together make for a comprehensive evaluation of rural ICT4D (Khene and Sewry, 2011: 326). Khene and Sewry (2011: 326) define a comprehensive rural ICT evaluation as:

> "*The comprehensive application of all appropriate domains of evaluation throughout the life of a rural ICT project, in ways that are adapted to the social, political, cultural, and economic rural environment, and designed to inform ICT interventions to improve and support rural development.*"

All evaluation domains evaluate a particular aspect of a project and interdependently build on each other to create a more profound evaluation. Such an evaluation should be sensitive to the rural environment and take into account external factors that may influence the evaluation throughout the project lifecycle (Khene and Sewry, 2011). The comprehensive approach should be "multidisciplinary, comparative, participatory and multicultural to contribute to research on different elements associated with ICTs in rural development" (Khene and Sewry, 2011: 326).

Figure 5.2 outlines the structure of the Rural ICT Comprehensive Evaluation Framework (RICT-CEF).

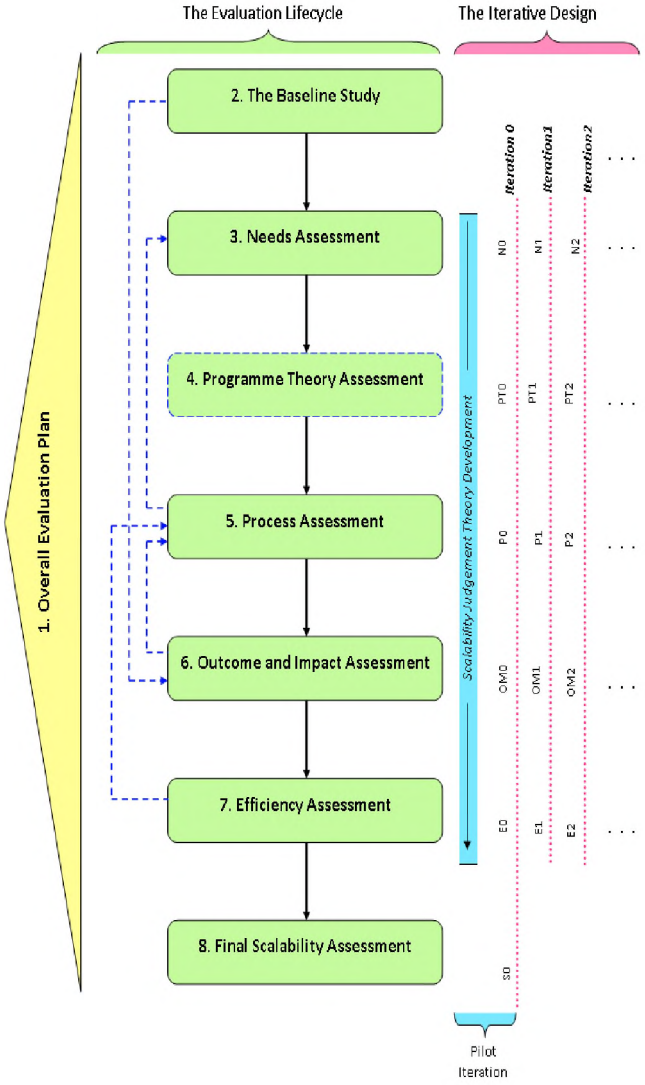


Figure 5. 2: The Rural ICT Comprehensive Evaluation Framework (RICT-CEF)

The RICT-CEF comprises of three main components. The first component outlines the overall evaluation plan. The evaluation plan provides a high level guide for the various evaluation

domains. Each domain has its own specific evaluation plan that meets the specific requirements for a particular domain. The second component forms the lifecycle that the ICT comprehensive evaluation should go through. The lifecycle describes the various domains that an evaluation should encompass and how these domains are interrelated to create a comprehensive evaluation. The domains that make up the comprehensive lifecycle are (Khene and Sewry, 2011: 327):

1. *The Baseline Study:* assesses the current state of the rural community.
2. *Needs Assessment:* assesses the information needs and desired development priorities of the community with the aim of providing solutions that can be supported by ICTs.
3. *Programme Theory Assessment:* assesses whether the design of the ICT4D programme is in line with supporting rural development programmes.
4. *Process Assessment:* assesses how well the project is operating to implement its intended goals and objectives.
5. *Outcome and Impact Assessment:* assesses the intended and unintended effects of the ICT project on the target community and the wider society.
6. *Efficiency Assessment:* assesses the cost associated with the effects/impacts of the project.
7. *Scalability Assessment:* assesses whether an ICT pilot project is scalable and assesses the conditions required to pit the project to scale.

The third component outlines the iterative design of the framework. Due to the changing nature of rural environments and the integration of technology, rural ICT projects adapt overtime as they undergo a continuous iterative cycle. All iterations are driven by the changing needs of the community. Ultimately, the RICT-CEF proposes the different levels that a rural ICT project should rely on for effective development (Khene and Sewry, 2011: 329).

The RICT-CEF is continuously being developed as part of ongoing evaluation research. To date, the first four domains of evaluation have been implemented within a rural ICT project in the Eastern Cape province of South Africa. The *Baseline Study,* the *Needs Assessment,* the *Programme Theory Assessment* and the *Process Assessment* have been implemented in the Siyakhula Living Lab in South Africa (refer to Appendix D). This research study focuses on developing and implementing the *Outcome* and *Impact Assessment* domain, which has not been developed and implemented.

5.6. CONCLUSION

The aim of evaluation should be to determine whether project objectives are relevant and have been achieved. Evaluation further aims to determine the efficiency of a project, effectiveness, impact, and sustainability of a project (Wieman et al., 2001: 4). Nonetheless, the evaluation of social programmes has its challenges. It is difficult to obtain 'hard numbers' and quantitative evidence about programme impacts, yet 'hard numbers' are what is required by policy makers and project funders. However, it is important to make use of multiple modes to evaluate such programmes to reach valid conclusions; consequently, using both qualitative and quantitative tools will enhance the richness of the evaluation (O'Neil, 2002). The implementation of ICTs can result in tangible, intangible and unexpected benefits. However, unquantifiable and intangible outcomes are more difficult to measure (Gomez and Pather, 2012). Moreover many ICTs facilitate change and have indirect impacts which make it difficult to measure (UNCTAD, 2011).

Various authors have formulated a set of guidelines to assess ICT evaluation that is effective, efficient and that builds local capacity. Such evaluations should aim to be participatory; socially inclusive; locally grounded; public and transparent; methodologically appropriate; sustainability enhancing; capacity building; reflective of shared vision; strategically oriented; and gender sensitive. Lastly, the evaluation design should also indicate the human resources required, including the training needed to integrate ICTs (Reilly and Gomez, 2001; Wagner et al., 2005).

In most cases, impact assessments are based on the before and after effects of the ICT project. It is not sufficient just to know what changes have occurred from the ICT project. How an ICT initiative has impacted a community and why a particular impact has occurred are the key aspects of impact assessment that informs policy formulation, ICT4D project strategy and decision making (Khene, 2010: 26). As a result, new theories of ICT evaluation need to be developed, theories that will enhance a deeper understanding of the effects that ICTs have on social outcomes and their level of success (Gomez and Pather, 2012). A change of perspective is required in the way ICT4D are viewed. Instead of asking "Do ICTs provide economic opportunities?" researchers should ask "How do ICTs improve economic opportunities?" (O'Neil, 2002: 94).

Chapter 6: An Analysis of Impact Assessment Frameworks - Critical Analysis

6.1. INTRODUCTION

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6.4. A CRITICAL ANALYSIS OF IS/IT PROGRAMMES

6.4.1. A Review across IT/IS Programmes

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6.5.1. A Review across ICT4D Programmes

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6.7. CONCLUSION

6.1. INTRODUCTION

The impact of ICT4D is a well explored area; however, much is still to be done in providing sufficient evidence for the role that ICTs play within rural development (Gomez and Pather, 2012: 2; Kozma, 2005: 6; Heeks and Molla, 2009: 2). A number of impact assessment frameworks have emerged that provide a means of assessing the outcome and impact of various development and information systems projects. This chapter aims to provide a theoretical analysis of existing impact assessment frameworks from social programmes, IS/IT programmes and ICT4D programmes. Firstly, the theorising approach followed is outlined. The criterion used for selecting articles is presented along with the template used to analyse the selected articles. Subsequently, the analysis of all the articles is described. The aim is to identify common areas/themes for outcome and impact assessment across social, IS/IT and ICT4D programmes. These themes are then reviewed to draw out general themes for assessing rural ICT4D programmes. The chapter is concluded with an overview of the final themes that have been identified as critical for rural ICT4D initiatives. It is concluded that the critical themes identified from the analysis potentially contribute towards a framework for the outcome and impact assessment of rural ICT4D projects.

6.2. THEORISING RESEARCH APPROACH

The Design Science approach guiding this research seeks to investigate the development of a framework (the design artefact) for outcome and impact assessment, which is implemented to assess its utility in the contexts it is applied. The theoretical development of the framework follows a deductive reasoning approach to theory development that is also partly based on inductive reasoning from the researcher's experience and participation in the implementation and evaluation of an ICT4D project called the Siyakhula Living Lab in South Africa. The theory developed is more than simply unconnected references that merely point to grand theories, but provides more precise descriptions of explanations of what is being extracted from theory, by investigating themes of outcome and impact assessment that contribute to a comprehensive evaluation (Weick, 1995). Therefore, deductive reasoning that forms the central role of initial construction is based on the analysis of selected frameworks or theories (kernel theories). These kernel theories contribute to the identification of outcome and impact themes for assessing the outcome and impact of ICT4D programmes based on a comprehensive evaluation. Figure 6.1 (Keuchler and Vaishnavi,) highlights the reasoning phases that many design science research projects naturally go through. It aids in graphically depicting the

theorising approach used within this study as indicated above. During the 'suggestion' phase of the project, prior research and kernel theories such as Programme Evaluation theory and existing outcome and impact assessment frameworks informed the conceptual framework design and its development in the 'Development' phase. Hence, deductive reasoning formed the key focus for the initial construction of the conceptual framework.

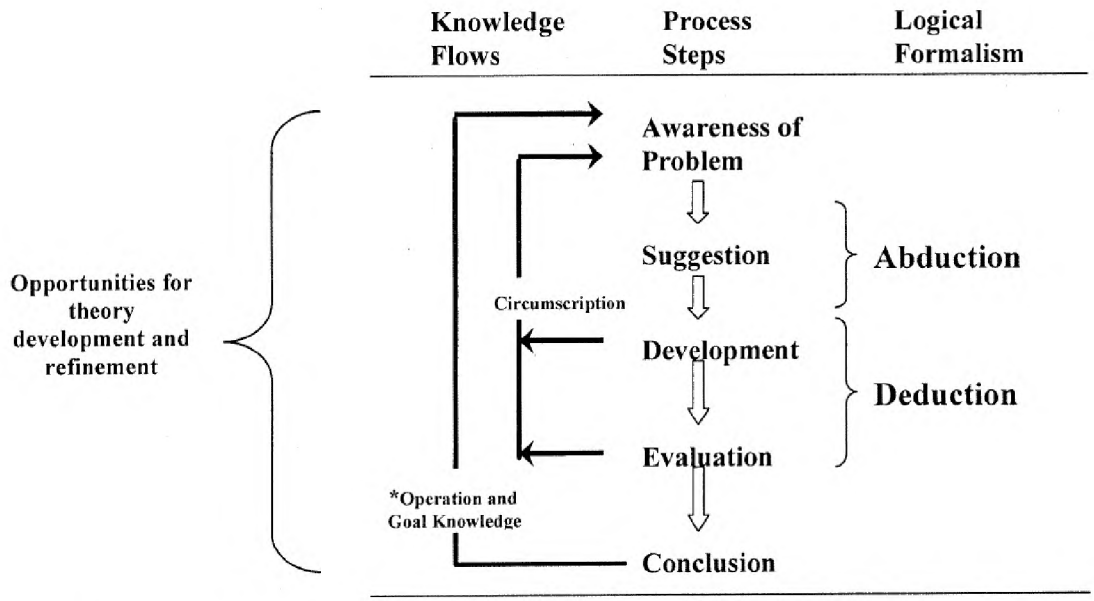


Figure 6. 1: Reasoning in the Design Research Cycle

(Keuchler and Vaishnavi, 2008:7)

Weick's (1989) theorising approach was adopted in this study to develop the design artefact. Weick's (1989) process of theorising is encapsulated around three components: 1) Problem Formulation, 2) Thought Trails, and 3) Selection Criteria. Using these three components, Weick (1989) describes theorising as "disciplined imagination", where *discipline* is exercised when "there is the consistent application of selection criteria to trial-and-error thinking" (Weick, 1989: 516), and *imagination* emerges when there is deliberate diversity in problem statements, thought trials, and selection criteria.

6.2.1. Problem Formulation

Research emerges from theoretical influence, and theory construction operates through a structure of sense making of our environments and contexts. Weick (1989) suggests that researchers should view the theory process as sense making rather than as problem solving. Moreover, Dubin (1976 as cited in Weick, 1989: 519) remarks that "a theory tries to make

sense out of the observable world, by ordering the relationships among elements that constitute the theorist's focus of attention in the real world". Therefore, solutions to theoretical problems are partly determined by the way the environment is perceived or represented. The richness and complexities embedded in problem formulation can originate from the theorist's past experience; this allows for more criteria than validation to become relevant to the process of theorising (Weick, 1989). The researcher of this study originates from a developing country, and participated in the operation of an ICT4D intervention since 2012. Moreover, the researcher has been exposed to implementation findings since the inception of the project in 2005. Over the years, many aspects regarding implementation and response from all stakeholders have emerged. Preceding evaluations have been conducted in the project (that is a Baseline Study (Pade-Khene, Palmer, & Kavhai, 2010), Need Assessment (Pade-Khene, 2012), Programme Theory Assessment (Pade-Khene, 2012), and Process Assessment (Osah, Pade-Khene, & Foster, 2014), which contribute to the current research domain on *Outcome* and *Impact* assessment. Furthermore, the researcher reflected on her experience using literature to substantiate and identify the gaps in the field and research, which motivate for the need for the development of the framework. The problem formulation has been highlighted in Chapters 1-5 of this study and is described before the actual process of selecting various frameworks that were analysed (in situ with the researcher's experience). Table 6.1 outlines the contribution of each chapter towards the Problem Formulation.

Table 6. 1: Research chapters highlighting Problem Formulation

Chapter	Contribution to Problem Formulation
Chapter 1: Research Introduction	The research problem is situated in its appropriate context.
Chapter 2: Research Approach	The overall research approach followed to solve the research problem is outlined.
Chapter 3: Rural Development	The need for rural development is outlined. Moreover, a variety of indicators for rural development are outlined, which inform the proposed solution to the research problem.
Chapter 4: ICTs for Rural Development	Failures and successes of existing ICT4D are discussed. The failure of existing ICT4D highlights the need for improved outcome and impact assessment of rural ICT4D projects, which further situates the research problem.
Chapter 5: Monitoring and Evaluation of ICTs in Rural Development	The need for a comprehensive approach to evaluation is highlighted. Moreover, the need for outcome and impact assessment to form part of a comprehensive approach to evaluation is discussed.

6.2.2. Thought Trials

Theorists generate conjectures (though trials) on ways to solve problems. This stage involves the trial-and-error selection of existing theories/frameworks that can contribute to the development of the artefact framework on outcome and impact assessment. Weick (1989) advised that a theorising process should incorporate a diversity of thought trials to produce better theory. Diversity can be viewed as heterogeneity in thought trials, which are more likely to solve theoretical problems than homogenous thought trials (Weick, 1989). Typical of much ICT4D evaluation literature is the popular use and adaption of the Technology Acceptance Model (TAM), Sen's Capability Approach, and/or Diffusion of Innovation (DOI) to explain such complex phenomena in ICT4D contexts, which actually have other, deeper seated theories that explain the phenomena, or non-existent theories that are yet to be developed that explain the phenomena (Grunfeld, 2007). When theorising in design science research with a deductive approach, kernel theories from different classes and fields should be drawn upon (Gregory and Munterman, 2011; Kuechler and Vaishnavi, 2008). Kernel theory often refers to theory adopted from other fields that explain or predict the phenomena under study (Kuechler and Vaishnavi, 2008:489). A thematic analysis of existing outcome and impact assessment frameworks assisted in the identification of themes for assessing ICT4D programmes based on a comprehensive evaluation. Table 6.2 outlines the process (Braun and Clarke, 2006) followed for identifying the Outcome and Impact themes from existing frameworks.

Table 6. 2: Thematic Analysis Process of existing Outcome and Impact assessment Frameworks

Phase	Description according to current study
1. Familiarising yourself with your data	This stage involved reading and re-reading through the existing outcome and impact frameworks and noting down initial ideas on the aspects from each framework that act as indicators for the assessment
2. Generating initial codes	This stage involved coding features that were interesting across all the frameworks, grouping relevant data to each code
3. Searching for themes	This stage involved gathering the codes into potential themes and gathering all data related to each potential theme
4. Reviewing themes	Reviewing whether themes relate to coded data and to the entire data set creating a map of the analysis
5. Defining and naming themes	This stage involved refining the details for each theme and the overall analysis story and creating clear definitions and names for themes

6. Producing the report	This is the final stage of the analysis. A final report is provided detailing the story of the data. It involves Relating the analysis back to the research questions through the presentation of the proposed theoretical framework – Chapter 7.

As ICT4D programmes are social programmes that make use of ICTs to facilitate social change; the themes identified should not only be drawn from ICT4D literature but should also take into account Social Programmes, and IS/IT (Information Systems or Information Technology) Programmes:

- *Social programmes* – Social programmes aim to positively influence the social conditions within a community to achieve outcomes that people desire (Rossi, Lipsey and Freeman, 1999). Such programmes form a foundation for ICT4D, as technology is used as a tool for social change and development (Gomez and Pather, 2012; Heeks and Molla, 2009: 2; Kozma, 2005: 6). Therefore, insights from social programme literature should underpin the evaluation of ICT4D programmes.
- *IS/IT programmes* – These provide insight into how technology can add value to an organisation. ICT4D initiatives make use of information technology and information systems as tools for development. Therefore, the principles from IS/IT evaluation can be applied in a development context as well. Furthermore, the challenges faced when measuring ICT productivity and impact are also relevant within an ICT4D context (Gomez and Pather, 2012).
- *ICT4D programmes* – Evaluation of existing ICT4D programmes provides lessons learned (negative or positive) that can inform the proposed framework. These programmes are important in identifying evaluation areas essential to the ICT4D context. ICT4D programmes are recognising the need to conduct more holistic evaluations that encompass direct and indirect effects of a programme (Gomez and Pather, 2012). Much like the shift in social programmes towards non-economic measures of human development, and the shift in IS/IT towards technology enablement, ICT4D should focus on ICT as an enabler of social and economic development (Gomez and Pather, 2012).

All three categories are considered important, as they provide insight and principles that can be beneficial within an ICT4D context.

6.2.3. Selection Criteria

This component is used to determine whether a framework/theory is selected or rejected. The process is based on the judgement of whether it is "interesting, obvious, connected, believable, beautiful, or real", in the context in which a problem is being solved (Weick, 1989, p. 524). Weick (1989) suggests that generic selection criteria substitute for validation knowledge, by using judgement to determine whether the theory is plausible. Judgement in relation to asking questions based on the criteria that is used lies behind a combination of considerable past experience (based on local experiences by the researchers of marginalised contexts, ICT4D evaluations and projects) with related problems that the theorist applies to the conjecture/framework. The credibility of generalisations that can be made to the components/themes of the Outcome and Impact Assessment framework being developed is dependent on the credibility assigned to the "evidence, arguments, and background theories used to develop the framework"; all based on the application of selection criteria to the selection of background frameworks (Baskerville and Pries-Heje, 2010: 275). Walsham and Sahay (2006) suggest that the development of theory in IS that relies on other theories should be conducted critically. The researcher should critically select what is relevant, and develop ideas within the specific problem domain. The frameworks selected for analysis in this study are based on the criteria outlined in Table 6.3, which could best support the identification of themes for outcome and impact assessment of rural ICT4D programmes. Through a review of various literature potential impact assessment frameworks were considered and only selected once they met the criteria set in Table 6.3. Many of the recent evaluation frameworks base their analysis on approaches that have been developed in the past, and as a result, some frameworks selected are older, presenting the original approaches. Older frameworks still possess valuable insights into evaluating Social, IS/IT and ICT4D programmes. More importantly, they provide a detailed description of the actual themes being assessed, rather than merely focusing on the assessment steps presented in more recent frameworks. Heeks and Molla's (2009) compendium of approaches on impact assessment of ICT4D projects proved to be a useful point of departure for assessment frameworks to be analysed. However, only a select few approaches met the selection criteria that was used in this study. For example, *entry 6* "Information Economics" and *entry 7* "Information Needs/Mapping" from their paper were initially considered but later rejected as they did not meet the criteria set out in Table 6.3. Moreover, the need for new approaches to evaluation ICT4D needs to emphasise learning overtime, which can only occur if evaluation takes place throughout a projects lifespan. The frameworks proposed by Heeks

and Molla (2009) do not all apply or emphasise evaluation overtime; therefore, the need for a continued analysis of alternative frameworks as well.

Table 6.3: Criteria used for selecting articles

Criteria	Description
1. *Outcome impact assessment focus:*	The frameworks should seek to assess a project's outcome and more specifically its impact.
2. *Framework indicates what is being assessed:*	Framework should outline what aspect of the project is to be assessed. The aim is to be able to identify themes from existing frameworks that can be used to inform the proposed framework.
3. *Framework meets template criteria (Table 6.4):*	The framework selected can be analysed using the template used for the analysis of frameworks described.
4. *Shows commonly discussed themes of development programmes:*	The framework should highlight commonly discussed themes in evaluation literature; including Rural Development, IS/IT and ICT4D literature.
5. *Framework is generic enough to be applied in other contexts:*	The outcome and impact assessment frameworks should be applicable in different contexts. Therefore, themes identified should be relevant to ICT4D despite the domain focus.
6. *Mixture of case applications and theory:*	Theory provides some useful guidelines that can be applied within an outcome and impact assessment. Case studies should also be considered, which will provide lessons learned and the instruments used for evaluation.

6.2.3.1. Template used for analysis of articles

A template acts as a basis for the comparative analysis of the selected frameworks. The criteria used to analyse frameworks is based on the main objective of this research, which is to identify critical themes for the outcome and impact assessment of rural ICT4D programmes, as part of a comprehensive approach to evaluation. Thus, the template draws on ideas that seek to highlight themes that can be applied within a rural context. Furthermore, the template seeks to highlight themes that take into account different domains of evaluation in order to conduct a holistic outcome and impact assessment of rural ICT4D programmes. Table 6.4 outlines the template used for analysing the chosen articles.

Table 6.4: Template used for the analyses of articles

Template Criteria	**Description**
1. *Title*	The title aids in identifying the framework and broadly indicates the overall field (Social, IS/IT, ICT4D) within which the framework exists.
2. *Aim of project/Issue being addressed*	Identifies the project focus that may influence what themes may be considered critical. Furthermore, the problems or issues being addressed may lead to themes that are important overall in development projects.
3. *Primary outcome and impact assessment themes*	Identifies the outcome and/or impact assessment themes considered critical and also indicates why they are important.
4. *Secondary outcome and impact assessment themes*	Identifies other themes that the article might not consider as critical but themes that may arise due to the particular context in which the framework is being applied. For such secondary themes their importance is dependent on the context of implementation.
5. *Context in which impact assessment is taking place*	Identifies the context in which a particular theme is being applied as it may influence the themes being considered in the framework. It is important that themes identified are applicable in a rural context as this research focus stems from rural ICT4D.
6. *Proposed approach to conducting impact assessment or how themes were assessed*	Determines the processes or approaches used to assess selected themes. Furthermore, the aim is to identify whether the evaluation process was conducted in isolation of preceding evaluations of the project lifecycle. This will guide how the proposed theme may be assessed as well.
7. *Methodological approach used – methods and instruments*	Identifies data collection tools and instruments that were used to assess themes and whether there is some commonality between them.
8. *Lessons learned/Limitations discovered*	Any limitations and drawbacks that have been identified can be used to inform future frameworks for impact assessment. The lessons learned from various frameworks can be useful for consideration in a proposed framework.

6.2.3.2. Frameworks Selected

Three categories of programmes have been selected, that is, Social programmes, Information Systems/Information Technology (IS/IT) programmes and ICT4D programmes. All three categories of frameworks are considered important as they can all provide valuable themes and principles that can be beneficial within an ICT4D context. Nine frameworks have been selected: three frameworks from Social programmes, two frameworks from IS/IT programmes, and four frameworks from ICT4D programmes. The selected frameworks are summarised in Table 6.5.

Table 6.5: Articles selected

Group/Category	Frameworks	Description
Social Programmes	**Framework 1**: Sustainable Livelihood Guidance Sheet Section 2 (Department of International Development [DFID], 1999)	The framework illuminates the various factors that influence the livelihood of the poor. It outlines outcomes required for development to take place. It is applicable at individual, household, group and community level.
	Framework 2: Communication for Social Change: An Integrated Model for Measuring the Process and its Outcomes (Figueroa, Kincaid, Rani, and Lewis, 2002)	The framework provides an iterative process for positive social change to take place in a community. It outlines primary and secondary themes to consider for social change to occur. The framework is developed for poor communities and can be applied in different contexts that inform sharing, collective understanding, agreement and action.
	Framework 3: Impact of information on Rural Development: Background, Methodology, and Progress (Mchombu, 1995)	The framework provides guidelines on mapping information needs of a community to an impact assessment. It works towards determining the conditions required for information to have an impact of achieving development goals. It outlines key outcomes and impacts to consider for assessment. The framework was applied in rural areas in Botswana, Malawi and Tanzania
IS/IT Programmes	**Framework 4**: Model of Information Systems success: A Ten-Year Update (DeLone and McLean, 2003)	The model aims to determine the value of IS management actions and investments. It outlines the themes to consider when assessing the net benefits of IS investments. The model can be adapted to different kinds of IS and therefore can be applied to ICT4D investments as well.
	Framework 5: Holistic Framework on Information Systems Evaluation with a Case Analysis (Hallikainen and Chen, 2005)	The framework aims to evaluate information systems in the broader context of the business development and IS development process. It outlines outcome and impact themes to consider when conducting the evaluation. The case study in which the framework was applied provided useful lessons for future evaluations.
ICT4D Programmes	**Framework 6:** Framework for the Assessment of ICT Pilot Projects (Batchelor and Norrish, 2005)	The framework aims to monitor and evaluate pilot projects to ensure such projects achieve their intended developmental goals. It also aims to provide evidence on how pilot projects may contribute to development. It outlines key themes to be assessed and provides a generic assessment description of ICT4D pilot projects.
	Framework 7: Monitoring and Evaluating Information	The framework is designed for the assessment of communications for development projects. The paper provides a set of guidelines on the various steps one

Group/Category	Frameworks	Description
	and Communication for Development (Myers, 2005)	can follow when conducting formative assessments and summative assessment of communication projects. It outlines outcome and impact themes that should be considered for the assessment. The framework can be applied to a list of different communication projects.
	Framework 8: Including the excluded: can ICTs empower poor communities? (Gigler, 2004)	The paper emphasises the role of knowledge and information flow in the process of expanding human and social capabilities of poor communities. The aim is to determine the conditions required for ICTs to empower poor communities; and thus to improve their lifestyle to an extent they value. The framework details the themes to assess and how each theme should be assessed. It also provides lessons learned from its application in a case study in a developing nation.
	Framework 9: An investigation of the impact of information and communication technologies in sub-Saharan Africa (Adam and Wood, 1999)	The framework developed aims to assess the impact of ICT use in sub-Saharan Africa and understanding user behaviour. It outlines the key areas to consider for impact. It provides a case example of its use in sub-Saharan Africa.

Each category of frameworks makes use of the template criteria to compare frameworks within a similar group. The analysis begins with identifying themes from social programmes, followed by IS/IT programmes, and lastly ICT4D programmes. The template criteria is further used as a basis for the overall discussion across all frameworks to assist in identifying potential critical outcome and impact themes common across all groups.

6.3. A CRITICAL ANALYSIS OF SOCIAL PROGRAMMES

Social programmes aim to positively influence the social conditions within a community to achieve outcomes that people desire. Such programmes form a foundation for ICT4D. In ICT4D, technology is used as a tool and driver of social change. Therefore, both social programmes and ICT4D programmes share a common goal of addressing social issues faced by the less advantaged. The articles on social programme evaluation that are selected provide a range of evaluation principles that are relevant in a rural context and, therefore, can be applied within an ICT4D context as well.

It has been noted that Sen's Capability approach and the Livelihood approach are the approaches frequently consulted when evaluating social programmes, especially with recent studies. As a result, the articles selected do incorporate the capability and livelihood approaches

and also look at two other approaches that do not primarily focus on the capability approach and the livelihood approaches, which may provide only one view for assessment.

Area of focus

Theories of development have evolved over the years from merely measuring economic growth towards a holistic approach that encompasses non-economic aspects as well (Alkire, 2010; Melamed et al., 2012). Similarly with ICT4D, new approaches to ICT4D evaluation would converge with development itself and incorporate more intangible measures that enhance the understanding of the effects of ICTs (Gomez and Pather, 2012). Both tangible and intangible measures for development are important as together they would provide a profound understanding of how and why current development trends are occurring or not occurring.

Both qualitative and quantitative measures are incorporated within the evaluation of social programmes. This is important and as a result the outcomes and impacts often identified within such programmes range from tangible aspects such as employment to intangible aspects such as collective self-efficacy. Intangible issues such as social cohesion and empowerment would be missed if measures only focused on quantitative dimensions like 'usage'. For example, an initiative that introduces community gardens would provide a means of uniting community members around a common goal of environmental conservation and food security. Such interaction and capacity building would not be identified through mere statistics of how many community members took part in the project. Such insight can add value within an ICT4D context to produce enhanced ICT4D evaluations.

Three frameworks that represent the outcome and impact assessment of social programmes have been selected for this particular analysis. Each framework is summarised using the criteria from the analysis template and discussed in comparison to the other frameworks within the same group. A more detailed discussion of each article is also provided in Appendix A with the aim of providing a comparison of all the articles within the social programmes group. Table 6.6 provides the template analysis of the selected frameworks for Social Programmes.

Table 6.6: Frameworks from Social Programmes

	Framework 1	Framework 2	Framework 3
Reference: Social Programmes	**DFID (1999) Sustainable Livelihood Guidance Sheet Section 2, DFID, London**	**Figueroa, M.E., Kincaid, D.L., Rani, M. and Lewis, G. (2002). Communication for Social Change: An Integrated Model for Measuring the Process and its Outcomes**	**Mchombu, K. (1995) Impact of information on Rural Development: Background, Methodology, and Progress**
Aim of project /framework/ Issue being addressed:	The livelihoods framework aims to provide a better understanding of the livelihoods of the poor. The framework illuminates the various factors that influence the livelihood of the poor. It provides a holistic understanding of the shocks, trends and seasonality that affect the poor and how the poor make use of the assets they possess to overcome the vulnerabilities they are faced with.	The Integrated Model of Communication for Social Change aims to provide an iterative process for community dialogue and community collective action to bring about social change that improves community health and the welfare of all community members. The framework explores various communication stimuli to bring about positive dialogue in a community and thus stimulate collective action to bring about positive change. The framework works towards solving community problems and requires collective action from the community to bring about social change.	The framework provides a guide on how to map information needs of a community to impact assessment. The aim is to investigate the impact of information in support of rural development. The framework provides a list of information needs, the benefits for each need identified and the services supplying those needs. It works towards determining the conditions required for information to have an impact (or fail to have an impact) on the attitudes, skills, and knowledge of target groups in order to achieve developmental goals.
Primary outcome and impact assessment themes:	• Increased income • Increased well-being ➢ Self-esteem ➢ Sense of control and inclusion ➢ Physical security ➢ Health ➢ Access to services ➢ Political empowerment ➢ Cultural heritage	• Collective self-efficacy • Ownership of project success • Social cohesion • Social norms • Collective capacity to engage	• Income generation • Employment • Soil conservation measures • Information on community leadership • Health information

	• Reduced vulnerability • Improved food security • Environmental sustainability/use of natural resources		
Secondary outcome and impact assessment themes:	• None	• Leadership • Participation • Information equity	• None
Context in which impact assessment is taking place:	The framework was not applied in a particular context however it is applicable at individual, household, group and community level.	The proposed framework is developed for poor communities in which a community takes collective action to bring about social change as a result of communication dialogue.	The paper provides a case example within rural areas. The framework was applied within community information centres in rural communities in three SADC countries (Botswana, Malawi, and Tanzania)
Proposed approach to conducting impact assessment/how themes were assessed:	The framework follows a more comprehensive approach. It takes into consideration preceding assessments so as to fully understand the nature, causality and processes that may lead to development impact. The framework takes into account the main factors and relationships between these factors that affect people's livelihoods and the outcomes they would like to achieve. The framework seeks to look at people's assets (their strengths), their objectives and the strategies they follow to obtain those objectives.	The paper does not propose a particular means of conducting an impact assessment. However, it does indicate that assessment can take place throughout a project. An indication of the change that has taken place within a community will only become evident if differences, which have taken place while the community engaged in community dialogue, have been noted at different times within the project (pre and post project implementation).	The framework measures the effectiveness and efficiency of information services being provided. Thus it is suggested that an impact assessment should not be conducted in isolation and should rather monitor and evaluate the entire process that leads to the impacts. Baseline data was collected at the start of the project and updating data was also collected on the key areas important for information provision.
Methodological approach used-methods and instruments:	• Interviews • Observations • Surveys • Focus groups	• Observations • Leadership ➢ Key informant interviews ➢ Interviews with community members	• Anecdotes will be collected using dialogue methods. ➢ Anecdotes will be analysed by categories and linked to the user

		➢ Programme records ➢ Focus groups ➢ Household surveys ➢ Representative sample surveys • Participation ➢ Key informant interviews ➢ Programme records ➢ Direct observations • Information equity ➢ In-depth interviews ➢ Individual representative sample surveys • Collective self-efficacy ➢ Media ➢ Key informant interviews ➢ Representative sample surveys ➢ Community leader meeting statements • Ownership ➢ Key informant interviews ➢ Surveys ➢ Focus groups • Social cohesion ➢ Sample surveys ➢ Focus groups ➢ In-depth interviews • Social norms ➢ Focus groups ➢ Interviews	context, environment, problems or changes that may have taken place as a result of information use ➢ Content analysis • Qualitative Interviews • Quantitative surveys
Lessons learned/limitations discovered:	• Some outcomes such as increased wellbeing are difficult to measure and translate into indicators that can easily be monitored.	• As the framework requires collective action to solve a community problem, it may become difficult to prioritise community needs and controversies may arise.	Not provided as this was a design paper rather than an actual impact assessment

	• It is difficult to provide an objective measure of impact by groups with different interests and priorities.		

6.3.1. A Review across Social Programmes

6.3.1.1. Aim of assessment and context

The frameworks all aim to provide a means of monitoring and assessing social programmes and more specifically the impact of these programmes on the development of poor communities. All frameworks draw from a variety of areas ranging from social aspects of development to environmental aspects; particularly Frameworks 1 and 3, which entail social, economic, and environmental factors that are relevant for sustainable development. Framework 1 sheds light on people's assets (livelihood assets represent people's strengths, and the resources they possess DFID, 1999: 1) and the vulnerability context (the external environment and its influence on the lives of people and the assets they possess). Framework 2 sheds light on various processes that can lead to positive social change within a community, while Framework 3 explores the impact of information needs on one's attitude, skills and behaviour in order to bring about social change. These frameworks provide a combination of outcomes, impacts, and some general evaluation guidelines for social development programmes. They outline the various factors that affect the lives of the poor and aid in determining why development projects have been successful or not. Therefore, these factors and processes provide a means of tracking a development programme and provide a checklist against which to monitor why particular outcomes and impacts have resulted.

6.3.1.2. Themes identified

Table 6.7 outlines the outcome and impact themes identified from these frameworks. Many of the themes are people centred, qualitative, and social, and focus on the well-being of individuals. The aim is to improve the welfare of the members within a community. These themes span across different aspects of sustainable development. They are flexible and adaptable to specific situations. Based on the purpose and goals of an evaluation these themes can be customised to suit an evaluator's goals. Secondary themes were observed across the frameworks, for example, themes such as attitude, skill and knowledge. These themes do have an effect on rural development. A positive change in attitude and an increase in skills and knowledge form a way of empowering people which can lead to a positive change in their livelihoods. Knowledge on farming techniques, health information and environmental guidelines may lead to a change in attitude to reduce health risks, reduce vulnerabilities and contribute to positive change. Although, these are secondary themes they do form a base for

the primary themes identified as they form part of the immediate outcomes that would lead to the long term impacts identified.

The primary themes are interrelated and not straightforward, and may pose some measurement challenges. For example, employment has an effect on income; access to health information and knowledge on health guidelines has an effect on one's well-being; while environmental sustainability and access to income may have an effect on food security. The majority of the themes identified and particularly those of Framework 2 are based on the intangible aspects of one's well-being and require qualitative tools for assessment. Factors such as social cohesion, well-being, self-esteem and collective self-efficacy are not easy to put into measurable terms and indicators. These factors are subjective and may be viewed differently in different contexts. Furthermore, the themes identified are based on community needs which may create priority problems due to conflicting needs. For example, community members may make use of and deplete natural resources in order to sustain an income and ensure food security.

Table 6.7: Outcome and impact themes identified from select social programmes

Framework 1: Sustainable livelihood guidance sheet	Framework 2: Communication for Social Change	Framework 3: Impact of information on rural development
• Income • Well-being • Vulnerability • Food security • Use of natural resources	• Collective self-efficacy • Ownership of project success • Social cohesion • Social norms • Collective capacity to engage	• Employment • Income generation • Health • Soil conservation • Community leadership

6.3.1.3. Summary of themes identified

The different assessment approaches identified more general categories that can best represent these impact assessment areas and their commonalities. Such groupings encapsulate the underlying characteristics of the individual themes that make up the group. It has been suggested that areas such as food security, income generation and employment should fall under 'vulnerability'. Vulnerability usually encompasses the influencing factors for the hardships faced by the poor. Therefore, food security and employment are common seasonality and shock factors that impact one's livelihoods. From the assessment approaches discussed

above the following themes for social programme outcome and impact assessment have been identified:

- *Collective self-efficacy* (DFID, 1999; Figueroa et al., 2002; Mchombu, 1995)
  This involves the ability and confidence of a community to work together and succeed at community projects. Collective self-efficacy also entails the attitudes, skill and knowledge of community members. Through strengthened community self-efficacy and individual self-efficacy, communities can achieve development goals given that their attitudes, skills and knowledge influence a positive change in behaviour.
- *Well-being* (DFID, 1999; Mchombu, 1995)
  Well-being usually involves the non-tangible aspects of one's welfare. These aspects include self-esteem, health, sense of control and inclusion, access to services, social cohesion, maintaining cultural heritage and physical security.
- *Vulnerability* (DFID, 1999)
  Vulnerability represents the external environment that affects the livelihoods of people. It involves the shocks, trends and seasonality that often negatively affect people's assets and the options available to them to pursue livelihood outcomes they desire.
- *Use of natural resources* (DFID, 1999; Mchombu, 1995)
  Maintaining environmental sustainability is an important aspect of sustainable development. Sustainable use of natural resources leads to long term benefits that enable communities to meet their present needs and those of the future. It should be noted that "the use of natural resources" is most applicable in ICT4D programmes that directly affect the use of natural resources. For example, the use of the natural environment for tourism purposes should consider how the natural environment is being affected and promote improved land use practices. Another example would be for ICT4D initiatives that focus on agriculture to consider the sustainable use of land resources when promoting agricultural productivity.

6.3.1.4. Relating to ICT4D

Given that rural ICT4D programmes aim for the development of rural communities the frameworks summarised for social programmes do provide some useful guidelines for determining the level of development attained from a given ICT4D initiative. All impact assessments conducted are based on a rural community level assessment, which can be applied

in ICT4D programmes. However, Frameworks 1 and 3 can be applied at an individual level assessment as well. Not only do the social programmes provide theoretical substance for ICT4D assessment but the themes identified can be facilitated by ICTs. For example, factors such as knowledge, health information, employment and seeking information on environmental sustainability can all be obtained with the aid of ICTs.

6.3.1.5. Comprehensive nature of assessment themes

All the above frameworks (1, 2 and 3) acknowledge that assessing outcomes and impacts cannot be conducted in isolation from prior evaluations of a project. Instead, assessments should take into account other factors, such as the processes that lead to outcomes and impacts and the project design in order to understand fully the resultant outcomes and impacts. These themes rely on preceding project evaluations and acknowledge that outcome and impact should not be assessed in isolation without taking into consideration other aspects of a project lifecycle. Processes and baseline data are beneficial in understanding the terms of outcome and impact.

6.4. A CRITICAL ANALYSIS OF IS/IT PROGRAMMES

The evaluation of IS/IT programmes provides insight into how technology, from a business perspective, can add value to an organisation. The same can be said for ICT4D and how technology can add value to achieving development goals. ICT4D initiatives make use of information technology and information systems as tools for development; therefore the principles from IS/IT evaluation can be applied in a development context as well. The use of technology and systems to promote economic growth also converges with the development of ICT4D. The transfer of technology for economic development in less development regions has become a modern phenomenon (Gomez and Pather, 2012). Furthermore, the challenges faced when measuring ICT productivity and impact are also relevant within an ICT4D context (Gomez and Pather, 2012).

Area of focus

IT outcome and impact within organisations has transformed from measuring the technical aspects of technology, to measuring its production and project management, and finally measuring the business benefits including intangible aspects such as loyalty and brand improvement. From a business perspective a tangible impact would be one that affects the business profitability directly and an intangible impact would indirectly affect the business

profitability and instead positively influence the business in other ways (DeLone and McLean, 2003; Hallikainen and Chen, 2005). In the past outcome and impact evaluation of IS/IT focused on quantitative measures; which is ideal for identifying usage and product quality measures. Such evaluations do not sufficiently accommodate for the role of technology as an enabler and as a transformative tool. Therefore, evaluations should be driven by the need to understand the role of IS in adding value to a business rather than the efficiency and effectiveness of such systems (Song and Letch, 2012). However, current IS/IT evaluation still focus on the technological and financial aspects; paying little attention to the organisational and social aspects (Song and Letch, 2012). There are still insufficient studies that focus on actual outcomes and impacts of IS/IT rather than the processes that lead to outcomes.

The frameworks selected focus on economic dimensions of evaluation, which is not surprising, as organisations often aim to create more strategic value for the business. Technology is only valuable when used by people (Pade-Khene and Sewry, 2011), which may explain the emphasis on use and user satisfaction when assessing the outcome and impact of IT. Usage, business value, product quality and adoption are common measurement indicators used in IS/IT impact evaluation (Gomez and Pather, 2012; Song and Letch, 2012). However, usage and product quality are more suited as outputs rather than actual outcomes and impact of technology in a business. As a result, such measurements may omit intangible benefits that may have occurred.

The value of IT progresses as the demand and supply of technologies increases within an organisation towards becoming an enabler within a firm. Similarly, as the demand and investment in ICT4D increases, so should the evaluation of such tools evolve towards indicators that depict enablement? There are varying approaches to evaluating IS/IT investments, therefore each approach should be suited to the context in which such investments are made. Technology can influence human relationships, it can shape institutions and the economy and one's moral values (Capurro, 2008). As a result, when evaluating technology the social, cultural, structural and ethical contexts should not be overlooked (Gomez and Pather, 2012).

Two frameworks have been selected for IS/IT programmes outcome and impact assessment. The DeLone and McLean IS success model has proved popular in many IS/IT evaluation frameworks as it is widely accepted and recognised within the IS field (Song and Letch, 2012) and as a result a ten-year update of the model was a suitable framework to analyse. Similarly

the holistic framework for IS evaluation proved suitable as it provides a broad understanding of IS evaluation in a wider context beyond the organisation itself. Much like the analysis for social programmes, the following analysis for IS/IT frameworks entails a comparative summary of the two articles that briefly introduces each article along with a summary discussion. A more detailed discussion of each article is presented in Appendix B. The aim is to identify the more critical themes for outcome and impact assessment of IS/IT programmes. Table 6.8 provides a comparative summary of the two articles.

Table 6.8: IS/IT programme frameworks

	Framework 4	Framework 5
Reference: IS/IT Programmes	**DeLone, W.L. and McLean, E.R. 2003. The DeLone and McLean Model of Information Systems success: A Ten-Year Update.**	**Hallikainen, P. and Chen L. 2005. A Holistic Framework on Information Systems Evaluation with a Case Analysis.**
Aim of project/framework/ Issue being addressed:	The paper provides an updated DeLone and McLean Model of IS Information Systems Success for measuring e-commerce system success. It also aims to evaluate the model given the changes in IS practice that have been taking place over a period of ten years. The D&M model aims to determine the value of IS management actions and investments and the usefulness of these investments.	The framework produced aims to understand the evaluation of information systems in a much broader context. The framework works on integrating the evaluation process into the overall business development and IS development process.
Primary outcome and impact assessment themes:	• Cost savings • Expanded markets • Productivity • Time savings	• IS functionality/product success • Risk • Strategic value • Financial productivity/ IS investment
Secondary outcome and impact assessment themes:	• Technical success ➢ Systems quality • Semantic success ➢ Information quality • Service quality	• None
Context in which impact assessment is taking place:	The assessment framework is applied within an e-commerce context. However, it can also be adapted to other types of information systems.	A case study was conducted in a Finnish insurance company

Proposed approach to conducting impact assessment/how themes were assessed:	Assessment of the net benefits of a system (impact) cannot be assessed and understood without measuring the system quality and information quality components of the model. Therefore, impact assessment cannot be done in isolation from evaluations of other aspects of a system. The updated model is useful in conducting a comprehensive measure of IS success as it draws on other components of a system and their interactions for evaluating the impact of an information system. Furthermore, the net benefits/outcomes assessed take into account both positive and negative effects of an information system.	The evaluation should identify the critical areas of the project before conducting the actual assessment. The evaluation should be built into the business development process, the IS development process and the IS procurement process. It takes on a three phase process of first evaluating the intangible benefits then the risks and finally the tangible benefits. Thus it aims to assess an IS investment throughout its life cycle in line with business activity and relies on an iterative process.
Methodological approach used-methods and instruments:	• Framework does not provide detail on methods or instruments to use for assessing themes	• Case study ➢ Questionnaires ➢ Qualitative interviews
Lessons learned/limitations discovered:	• It is important to measure the interactions between dimensions so as to determine the isolated effects of independent variables on the dependent dimensions. • More field study research is required to investigate net benefits measures. • The model places much emphasis on use and user satisfaction, which are not actual impacts. • The model only considers positive characteristics for an IS investment and does not explicitly indicate any potential negative effects that could arise.	• The success of IS usefulness has been considered as an important theme for outcome; however, such a theme implies a process that leads to particular outcomes. • The interrelationships between concepts have not been discussed in detail • Not clear on defining the different elements that make up the evaluation process

6.4.1. A Review across IT/IS Programmes

6.4.1.1. Aim of assessment and context

The outcome and impact evaluation of IS and IT programmes work towards determining the effects information has on the receiver. The aim is to measure the value and usefulness of information systems (IS) investments. Given that we live in a digital age where technology evolves at a fast pace IS/IT impact evaluation should adjust to the constantly changing business environment. Both frameworks make use of case study applications making the frameworks more operational. Not only is the theory relevant but the practical components makes these frameworks more applicable in other IS contexts. IS investments are often set on delivering technological capabilities to achieve organisational goals. Therefore, it is not surprising that the outcome and impact assessment frameworks pay much attention on the actual information system and product success and not the actual end goals that an information system aids an organisation to achieve.

6.4.1.2. Themes identified

The assessment themes for IS programmes focus on monetary features and creating a more favourable economic position for an organisation. This is apparent as the initial objectives of the information system investment (from both frameworks), centred on a high return on investment and executing more effective business transactions and ultimately profits. Based on the themes and the other dimensions for IS success evaluation, these frameworks place much emphasis on use and user satisfaction (Framework 4 emphasises use and user satisfaction; while Framework 5 emphasises usefulness and development). Although use and user satisfaction are not actual project impacts they are important precursors that should not be overlooked. The level of use and user satisfaction will result in certain net benefits which represent the individual and organisational impacts of an information system. The "outcome" from Framework 5 along with use and user satisfaction from Framework 4 are better suited as processes that would lead to particular IS investment outcomes. It is suggested that the "success of IS investment", "financial productivity", "risk" and "strategic value" are more appropriate criterion for outcome. It should be noted that product success would be viewed more as an outcome that may lead to much longer term impacts. If the product is successful the financial profitability and better strategic value are likely to occur; whereas if a product is not successful then it would lead to increased cost and may lead to business project failure.

Much like Framework 4, the success of IS usefulness has also been considered as an important theme for outcome. However, such themes once again imply a process that leads to particular outcomes and long term impacts. The usefulness of an IS would determine the level of positive impacts gained from the use of that particular IS. However, increased usefulness is not the final outcome of the IS investment nor is it an impact of the system itself within an organisation. The actual effects that the system has towards the organisation and the goals the organisation wishes to achieve are and should be the outcomes and impacts to be aware of. The usability and success of IS development are the interim processes that lead to desirable or undesirable impacts.

The information systems frameworks also allude to the idea that only positive impacts result from a project and do not explicitly indicate any potential negative net benefits that could arise from IS investments. For any impact assessment, evaluators should be aware that unintended impacts could also be negative; else negative impacts would go unnoticed. Table 6.9 lists the outcome and impact assessment themes identified from the IS/IT frameworks.

Table 6.9: Outcome and impact themes identified from select IS/IT programmes

Framework 4: D&M Model	Framework 5: IS evaluation model
• Cost savings • Expanded markets • Incremental additional sales • Reduced search costs • Time savings	• Strategic value • Risks (reduced) • Financial profitability • Product success

6.4.1.3. Summary of themes identified

Both frameworks draw emphasis on the financial aspects of an organisation or the bottom line which is to make a profit. From the IS/IT frameworks analysed all themes can be categorised either as reducing risk, increasing organisational revenue or increasing organisational value. There are overlapping themes that can be integrated to represent the outcome and impact of information system programmes. The following categories for outcome and impact have been suggested:

- *Risk* (DFID, 1999; Hallikainen and Chen, 2005)

  Assessing risk would normally incorporate a reduction in organisation risk as a result of the system intervention and project time savings. It would also incorporate the

identification of, and improvement in risk mitigation strategies. In an ICT4D context the assessment of risk represents identifying the risks or harm towards target population as a result of the ICT4D initiative. Furthermore, it represents identifying the ways in which an ICT4D initiative aids to improve livelihood strategies given the vulnerabilities facing the poor.

- *Return on investment* (DeLone and McLean, 2003; Hallikainen and Chen, 2005; Rossi et al., 1999)

  The assessment of return on investments considers whether company costs have been lowered, and whether there has been an increase in the financial productivity of the firm. Furthermore, it considers whether there has been an improvement in the efficiency of the organisation or efficiency in completing organisational tasks. From an ICT4D perspective it is useful to assess the costs associated with the project effects. Assessing the benefits and effectiveness of the ICT4D programme against the costs incurred provides a monetary measure of the impacts of the project.

- *Strategic value* (DeLone and McLean, 2003; Hallikainen and Chen, 2005)

  Assessing the strategic value of a firm would determine whether the IS investment has had an effect on the competitive position of the organisation and the organisations market position. From an ICT4D perspective the assessment of strategic value would assess the value the project outputs have on development and how the ICT4D initiative situates itself amongst the overall development goals in the area.

The above categories encompass the 'net benefits' and the 'outcomes' observed both from Framework 4 and 5. These are the suggested key areas for assessing Information Systems projects. The outcomes which are the more immediate effects would be product success and financial profitability which would lead to more long term effects such as 'strategic value'.

6.4.1.4. Relating to ICT4D

Both Framework 4 and 5 are comparable to the ICT4D value chain proposed by Heeks and Molla (2009). Much like the ICT4D value chain, these IS frameworks have some form of "readiness measures" and "availability and implementation measures" in place that are represented by the "outset situation" from Framework 5 and the "system quality", "information quality" and "service quality" dimensions from Framework 4. For example, the IS success Model from Framework 4 is made up of "information quality", "system quality" and "service quality" dimensions which represents the creation stage of a system. These aspects can be

mapped to the readiness and availability stages of the ICT4D value chain which refers to the prerequisites for an ICT4D initiative and the process of implementing of the ICT4D project. From Framework 5 the "outset situation" represents the organisational environment, the resources available and the nature of the investment being made. These aspects can be mapped to "readiness" from the ICT4D value chain which again represents assessing the prerequisites of an ICT4D initiative. Furthermore, the project adoption and use of information systems from both frameworks can be associated with the "uptake" component of the ICT4D value chain, which then leads to some form of impact. For example the "system use" and "user satisfaction" dimensions from Framework 4 represent the nature of use of the system. This aspect can be mapped to the uptake stage of the ICT4D value chain. The assessment of "uptake" represents the extent to which the ICT deliverables are adopted and used which is associated to "system use" and "user satisfaction". From Framework 5 the "business development", "IS development and procurement", "success of IS development", and "success of IS usefulness" can be mapped to how an ICT4D is implemented and how the ICT deliverables are used. These make up the "availability" and "uptake" components of the ICT4D value chain respectively. Lastly the "net benefits" (or as it was originally known as individual impact and organisational impact) dimension from Framework 4 represents the effects that occur as a result of using the system. This aspect can be mapped to the impact stage of the value chain. The impact stage represents the cost, and benefits associated to the project and the overall contribution made. From Framework 5 the "outcomes" component represents the overall success of an information system process and product success. These aspects can be mapped to the "impact" stage of the ICT4D value chain, which takes into account the output, outcomes and development impacts of an ICT4D initiative. As a result, the frameworks do provide some useful guidelines that can be applied within an ICT4D context.

6.4.1.5. Comprehensive nature of assessment themes

As shown by Framework 5, IS evaluations should be comprehensive and should take into account the entire life cycle of the IS investment. Framework 5 works on integrating the evaluation process into the overall business development and IS development processes that rely on an iterative process. Therefore, the processes and causal relationships demonstrated by both frameworks are still relevant. Such features would represent the other evaluation domains important for assessment and for enhancing outcome and impact assessments. Therefore, it

places the impact assessment in its rightful context and aids in understanding why and how these outcomes and impacts have occurred, which forms a key feature of any evaluation.

6.5. A CRITICAL ANALYSIS OF ICT4D PROGRAMMES

The articles selected for ICT4D programmes identify areas of importance when evaluating the outcome and impact of ICT4D programmes. Much like the shift in social programmes towards non-economic measures of human development and the shift in IS/IT towards technology enablement, ICT4D should focus on ICT as an enabler of social and economic development. However, it does become a challenge when ICTs enable outcomes and impacts that are difficult to link from a causal perspective (Gomez and Pather, 2012). Although such intangible measures are difficult to measure they do indicate deeper effects on communities and individuals.

Area of focus

ICT4D programmes are recognising the need to conduct more holistic evaluations that encompass direct and indirect effects of a programme. Often the tools and techniques used to evaluate technology have not been sufficient for social development (Gomez and Pather, 2012). Updated theories of ICT4D evaluation should be developed; ones that highlight the social outcomes of ICTs as well. As there is often no direct causal relationship between ICTs and social development, it is important to understand all the processes involved within a project and consequently the evaluation of all stages of a project lifecycle. Current theories on ICT4D impact have not been comprehensive enough to capture the full effects of rural ICT projects. Existing assessments have not explicitly considered all preceding domains of evaluation as stipulated in the RICT-CEF (as discussed in chapter 4). The evaluation of the readiness, availability, uptake, and process of ICT4D are important evaluation domains that inform the outcome and impact assessment of Rural ICT projects. The evaluation domains along with the outcome and impact assessment together contribute towards the comprehensive evaluation of ICT4D. Such an approach has been lacking in current ICT4D impact assessments

Four frameworks have been analysed and discussed within this section. A detailed discussion of each framework is provided in Appendix C. Table 6.10 provides a comparative summary of the four articles selected.

Table 6.10: ICT4D programme frameworks

	Framework 6	Framework 7	Framework 8	Framework 9
Reference: ICT4D Programmes	**Batchelor, S. and Norrish, P. (2005) Framework for the Assessment of ICT Pilot Projects, InfoDev, World Bank**	**Myers, M. (2005) Monitoring and Evaluating Information and Communication for Development (ICD) Programmes**	**Gigler, B.S. (2004) Including the excluded: can ICTs empower poor communities**	**Adam, L. and Wood, F. 1999. An investigation of the impact of information and communication technologies in sub-Saharan Africa.**
Aim of project/frame-work/ Issue being addressed	The framework aims to monitor and evaluate pilot projects to ensure such projects achieve their intended developmental goals. It also aims to provide evidence on how pilot projects may contribute to development and the success factors required for project expansion and replication.	The framework is designed for the assessment of communications for development projects. The paper provides a set of guidelines on the various steps one can following when conducting formative assessments (from pre-project implementation, baseline study to on-going process evaluation) and summative assessment of communication projects.	The paper provides an alternative evaluation framework based on Sen's capability approach. The framework substitutes the capabilities idea for livelihoods. The aim is to determine the conditions required for ICTs to empower poor communities; and thus enhance their individual and collective capabilities to improve their lifestyle to an extent they value.	The framework developed aims to assess the impact of ICT use in sub-Saharan Africa and understanding users and their behaviour.

	Framework 6	Framework 7	Framework 8	Framework 9
Primary outcome and impact assessment Themes	• Sustainability[are the project outputs and outcomes sustainable] • Direct livelihoods of the poor • Communication systems and information sources. Changes in access to information and knowledge • Change in behaviour of community members as a result of the ICT initiative • Most significant change that has taken place within the community • Environmental sustainability	• Change in behaviour of community members(KABP) ➢ Knowledge ➢ Attitude ➢ Behaviour ➢ Practice • Most significant change brought about from actual ICT4D events	• Reinforcing existing social and organisational structures. The need to understand the institutional structures and processes aims to transform livelihood resources into the expansion of capabilities. • Empowerment ▪ information capabilities, human capabilities, social capabilities ➢ Social development ➢ Economic development ➢ Political participation ➢ Cultural identity ➢ Psychological and organisational development	• Indigenous capacity building ➢ Human capacity ➢ Skills innovation ➢ Five levels of impact were identified: government, education, business, organisations and individual levels. • Management awareness • Knowledge and learning
Secondary outcome and impact themes	• Policy changes • Uptake/provision of ICTs • Service delivery efficiency • Involvement in civil society • Changes in entrepreneurial environment • Sustained economic growth • Reduction in poverty, hunger and disease	• Training and contributing to local education • Social inclusion • Access to information by all local community members • Linguistic impact	• Ownership - Adoption and meaningful use of ICTs • Sustainability • Capacity building • Strengthening existing organisations • Increased transparency and efficiency within organisations • Improved access to basic services	• None

	Framework 6	Framework 7	Framework 8	Framework 9
	• Changes in governmental institutions that regulate the market			
Context in which impact assessment is taking place	The framework does not assess a particular project but instead provides a generic assessment description of ICT4D pilot projects. The framework however advises making use of baseline data within the assessment. It highlights the need for understanding the context and conditions in which outcomes and impacts have occurred.	No specific context has been provided for which the guidelines can be applied. However, the framework does provide a list of programmes the guidelines apply to: • Face-to-face communication or information activities • Community level communications i.e. workshops • TV, radio, film and video • Internet and email communication s programmes • Telecommunications based projects	The investigation was conducted with indigenous people from Peru. The framework highlights the need for acknowledging the broader context and the extent to which the environment enables ICTs to empower poor communities.	The framework is developed for use in a sub-Saharan African context. • Local ICT users in Ethiopia • Informants from other African countries
Proposed approach to conducting impact assessment/how themes were assessed	The framework highlights the importance of not assessing themes in isolation but also taking into account the relationship and processes that leads to impacts. The framework does consider other domains of evaluation, in particular 'implementation' and 'uptake'. However the focus is on impact with the aim of bridging the gap between the outputs of a project	The approaches followed involve some form of quantitative surveying and qualitative interviewing. The methods proposed can be used throughout the life cycle of a project and rely on baseline data.	The framework analyses the conditions required for the informational capability to have a positive effect on other capabilities such as psychological, cultural, social and economic capabilities. It necessitates the need for understanding the relationships that lead to impact.	The assessment was conducted over a period of two years and involved two rounds of theoretical and systematic sampling. The impact assessment was not based on any preceding evaluations. Although the framework does suggest that outcome and impact assessments conducted in

	Framework 6	Framework 7	Framework 8	Framework 9
	and the long term impacts that may result. The framework asks questions around: • Long-term and unintended impacts • relevance of project goals • sustainability of goals • process of achieving goals and project outcomes • impact of MDGs • scalability		The evaluation framework is based on the priorities of the community members themselves [based on the information needs assessment conducted in the initial stages of the project] and the processes involved in transforming livelihood resources into enhanced capabilities that will lead to improved livelihood outcomes. The framework further suggests that the empowerment at the individual and community level should be conducted separately.	isolation do not provide comprehensive data.
Methodological approach used- methods and instruments	The framework makes use of both quantitative and qualitative techniques for assessing outcome and impact. • Direct livelihoods effect ➢ Household surveys ➢ KABP surveys ➢ Community Communication systems ➢ Participatory appraisals • Enabling environment ➢ KABP survey ➢ Tracer study ➢ Delphic survey • Uptake/provision of ICTs	• Experimental impact studies (after only; before and after; before and after with comparison groups; time series) ➢ Qualitative surveys ➢ Qualitative focus groups ➢ Participatory observations • Most significant change ➢ Collecting stories from stakeholders. ➢ key informant interviews	• Participatory ➢ Focus groups through consultation workshops ➢ In depth interviews	• Grounded theory approach ➢ Theoretical sampling to identify emerging ideas ➢ Informant interviews ➢ Field notes ➢ Data transcribed and analysed using the comparative analysis method

	Framework 6	Framework 7	Framework 8	Framework 9
	➢ Tracer studies ➢ Quantitative data on technology • Service delivery efficiency ➢ Tracer studies ➢ Change in practice survey • General formative monitoring and evaluation ➢ Outcome expectations ➢ Most significant change ➢ Field notes and project interviews ➢ Photography, audio recording and video			
Lessons learned/limitations discovered	Only a generic framework is provided and no actual application was conducted. Furthermore the framework has no direct causal link for ICT4D initiatives.	• Experimental impact studies can be technical and expensive. • Change in behaviour does not always develop logically. For example, knowledge of a particular issue does not always lead to a change in behaviour and attitude. • Societal values may also dominate and undermine individual interests. • People may lie during surveys or experience questionnaire fatigue	• The most direct impact of technology on a community is the psychological empowerment of poor communities. • The framework highlights that there is no direct causal relationship between ICTs and empowerment but rather this relationship is multidimensional and should be viewed in a more holistic sustainable human development context. • The lessons learnt from the case application focused on the success factors of ICT4D, rather	• Constraints: ➢ Political(policy) influences ➢ Limited management understanding ➢ Limited resources ➢ Poor infrastructure ➢ Lack of information for learning, content and for exchanging experiences

	Framework 6	Framework 7	Framework 8	Framework 9
		• Suitable for evaluating projects with a particular aim for example increasing HIV/AIDS awareness by a specific percentage. • Most significant change is purely qualitative and is not suitable for projects that require quantitative data.	than the lessons from the actual impact assessment conducted. • The framework does not provide much detail as to the various methods and techniques available for assessing outcome and impact themes.	

6.5.1. A Review across ICT4D Programmes

6.5.1.1. Aim of assessment and context

The frameworks summarised in Table 6.10 aimed at highlighting areas required for assessing the development of poor communities. These frameworks work towards determining the effects ICTs have on rural development. Framework 6 aimed to evaluate pilot projects and how they fulfil their intended goals and how a project has contributed towards development. Framework 7 makes use of communication programmes and assesses the significant change made within a community as a result of the project. Framework 8 determines how ICTs empower poor communities in such a way that it contributes towards their development goals; while Framework 9 determines the use of ICTs and how they can build the indigenous capacity of a community.

The frameworks discussed work towards identifying change in community behaviour and social change brought about by an ICT4D initiative. They all focus on a change that has taken place overtime and draw on the perceptions of community members and the target audience to conduct the impact assessment. This approach is useful as community members themselves are the ones who experience the change. Therefore, the change that has taken place is depicted through their perceptions. As indicated in Framework 7, consulting user perceptions has the benefit of identifying unintended outcomes and also understanding why particular changes have resulted. Unintended project effects are equally important for assessment in order to take into account any factors that were not originally planned for in the early stages of the project. This becomes useful and relevant for similar future ICT4D projects.

It is important that the resultant change or the goals that have been identified are aligned with the desires of the intended audience. If they are not, that change would not be meaningful to project consumers and the project will be deemed a failure in the eyes of community members. As stated by Rossi et al. *(*2004: 204) "*no matter how well a programme addresses target needs, embodies a good plan … it cannot be judged successful unless it actually brings about some measure of beneficial change…*" For example, the social change and behaviour change initiatives addressed by Framework 7 are in their own right a form of empowering community members to bring about a change that they desire. This supports the basis on which Framework 8 is founded. The knowledge and information provided by communications projects aims to inspire community members and in that sense motivate them to take ownership of their

development and become empowered to achieve goals they desire as outlined by Framework 8.

6.5.1.2. Themes identified

Table 6.11 lists the primary themes identified from each article. All frameworks aim to empower people with the skills, knowledge, the attitude and opportunity to bring about positive change they find valuable.

Table 6.11: Outcome and impact themes identified from select ICT4D programmes

Framework 6	Framework 7	Framework 8	Framework 9
• Livelihoods of the poor • Communication systems of the poor • Change in behaviour • Most significant change	• Change in behaviour • Most significant change	• Empowerment • Information Capabilities • Human capabilities • Social capabilities	• Human capacity building • Skills innovation • Knowledge and learning

Emphasis has been placed on changing behaviour and how knowledge and information flow may be used to expand the human and social capabilities of individuals. The frameworks emphasise the need to identify not only the direct and tangible outcomes and impacts but also identify other forms of impact. From the themes identified it has been noted that it is a challenge to measure qualitative themes such as empowerment. Empowerment is not easily quantified as it often entails intangible indicators such as increased self-esteem and it is context specific as well. Therefore, Framework 8 highlights the need for acknowledging the broader context and the extent to which the environment enables ICTs to empower poor communities (Gigler, 2004).

As ICT4D impacts can be both short and long term, and negative and positive, the frameworks studied provide an environment that takes into account these types of impacts. This will ensure that all possible effects and lessons learnt from the project are taken into account and documented for future purposes (Batchelor and Norrish, 2005). An underlying theme across all frameworks is the sustainability of project outcomes and impacts and the conditions required for sustainability. It should be noted that the sustainability of the project itself might not be necessary. It may happen that the project itself is not sustainable but its outcomes (project concept) are (Batchelor and Norrish, 2005). As noted by Ali and Bailur (2007), it is more important to sustain the concept of an ICT4D initiative rather than the artefact itself. For

example, the artefact for communication has changed over time from the letter, to telegraph, to mobile phones, to email and so forth; however the concept of communication has been sustainable over the years (Ali and Bailur, 2007).

Based on the frameworks studied, outcome and impact assessments should encompass social, economic, and environmental impacts (Adam and Wood, 1999; Batchelor and Norrish, 2005; Gigler, 2009; Myers, 2005). From the papers explored Framework 6 does not explicitly specify impacts within the distinct categories of 'economic', 'social' and 'environmental' impacts; however the framework does make room for identifying unintended impacts on the wider social, economic and environmental field. Framework 8 draws on empowerment theories that rely on political, social and economic spheres namely the key dimensions of Human development: social development, economic development, political development, cultural identity and organisational development (Gigler, 2004). Furthermore, Framework 9 also provides diverse outcome and impact themes that encompass social, economic and political aspects.

6.5.1.3. Summary of themes identified

From the above discussions of ICT4D impact assessment a number of key themes for impact have been identified. These themes are interrelated and work together to produce a broad sphere for assessing the outcomes and impacts of ICT4D programmes. It has been noted that a number of themes coincide and others merge to form higher level themes. The following broad categories have been identified:

- *Behaviour change*

  Behaviour change is a suitable means of determining the 'before and after' effects of an ICT4D initiative. It provides a useful way of determining individual's behaviour towards the programme and how their behaviour has changed in favour of achieving their development goals (Myers, 2005).
- *Most significant change*

  Most significant change captures changes that are considered important and why from the perspectives of those experiencing the change. With an ICT4D project the aim is to facilitate development by means of bringing about some change within a community so as to achieve desirable development goals (Myers, 2005).

- *Livelihoods*

  Livelihoods captures the living standards and means of support available to people. The well-being of individuals would fall under livelihoods. The livelihoods of individuals are affected by various trends, shocks and seasonality for example employment opportunity and service delivery. Important sub-themes to be aware of are well-being and service delivery (DFID, 1999).

- *Sustainability*

  Sustainability of the positive outcomes and or impacts of a project are important. Also understanding the conditions under which sustainability is taking place is necessary for future project investments and for scalability purposes (Batchelor and Norrish, 2005).

- *Empowerment*

  Empowerment can be determined at the individual, collective or societal level; whereby individual empowerment is based on power of the individual and developing their self-esteem. Collective empowerment is based on the collective power of a community and societal empowerment is based on the need for social and political change to take place at the national level. Empowerment captures the expansion of informational, human and societal capabilities. Therefore, a number of outcome factors may result. Such factors may include security, human capacity building, skills innovation, participation, leadership, improved management, information literacy, power, stress and problem solving (Gigler, 2004).

6.5.1.4. Comprehensive nature of assessment themes

The ICT4D programmes studied acknowledge the internal workings of a project and the importance of evaluating various aspects of a project lifecycle. The frameworks emphasise the importance of baseline data with the aim of bridging the gap between the outputs of a project and the long term impacts that may result. However, outcome and impact assessments require more than baseline data. To ensure a comprehensive evaluation, all preceding evaluations throughout the project lifecycle should inform outcome and impact assessments. Outcome and impact assessment goes beyond the common assessment which often assesses the outcomes of a project without taking into account any preceding domains of evaluation. Such impact assessment methods on their own do not truly reflect the effects of a project and as indicated by Framework 6, the gap between project outputs and impacts has to be understood to determine the causal effects and conditions for sustainability and future project expansions. Understanding the context and conditions for outcome and impact become important for

purposes of sustaining a project or rather sustaining the core goals of the project and scaling a project for future purposes. The project processes and the project context are all important factors for assessment. As a result, understanding the internal workings of a project and the relationship between the project outcomes and impacts, and how the outcomes may lead to wider development goals is beneficial for learning purposes (Batchelor and Norrish, 2005; Heeks, 2005).

6.6. AN OVERALL REVIEW OF THOUGHT TRAILS AND FRAMEWORK SELECTION

As rural ICT4D programmes are social programmes that make use of IS and IT to facilitate development and improve social circumstances it is advisable to reflect on the themes from social programmes, IS/IT programmes and ICT4D programmes when assessing ICT4D projects. As with previous framework discussions, the following section discusses all themes identified from all groups with the aim of identifying areas of prevalence and areas that need special attention in relation to ICT4D initiatives.

6.6.1. Aim and Context

The frameworks discussed previously all identified a number of outcome and impact themes that were considered important for evaluating Social, IS/IT and ICT4D programmes. The frameworks from Social programmes and ICT4D programmes all focused on the development of poor communities and bringing about positive social change within these communities. IS/IT programmes focused on the value of IS/IT investments and product success. In summary all frameworks aimed to bring about a positive change to resolve an existing issue. The themes from IS/IT frameworks were highly influenced by the competitive nature of businesses and the economic environment. As a result, emphasis was placed on product success and the technology. The frameworks from both social and ICT4D programmes placed emphasis on the human aspects of the programme investment rather than the actual investment itself. This can be attributed to the influence of the development context for which these frameworks were designed.

6.6.2. Overall Outcome and Impact Themes Identified

It is important to differentiate outcomes and impacts as all programmes result in different immediate outcomes which in turn lead to long term impacts. An outcome is "*the state of the target population or social conditions that a programme is expected to have changed*" (Rossi, Lipsey and Freeman, 2004: 204). Outcomes would normally represent the characteristics that

can be observed in people or the situation and not the outputs (a feature of a programme process); whereas impact would be the net effects of a programme. Net effects would normally be assessed after a project has been running for a period of time long enough to eliminate any implementation problems that may have arisen (Rossi et al., 1998). For many social programmes like ICT4D, the psychological factors such as attitude, knowledge, awareness, skills, motivation, and behaviour intentions are the factors that make up the immediate outcomes of a programme. These factors were identified as secondary themes in previous assessment frameworks discussed, namely the frameworks from social programmes. These themes may lead to more long term outcomes such as increased employment opportunity, increased well-being, sustainable natural resource use and increased empowerment. Figure 6.2 shows examples of programme effects on immediate and long term outcomes (impacts).

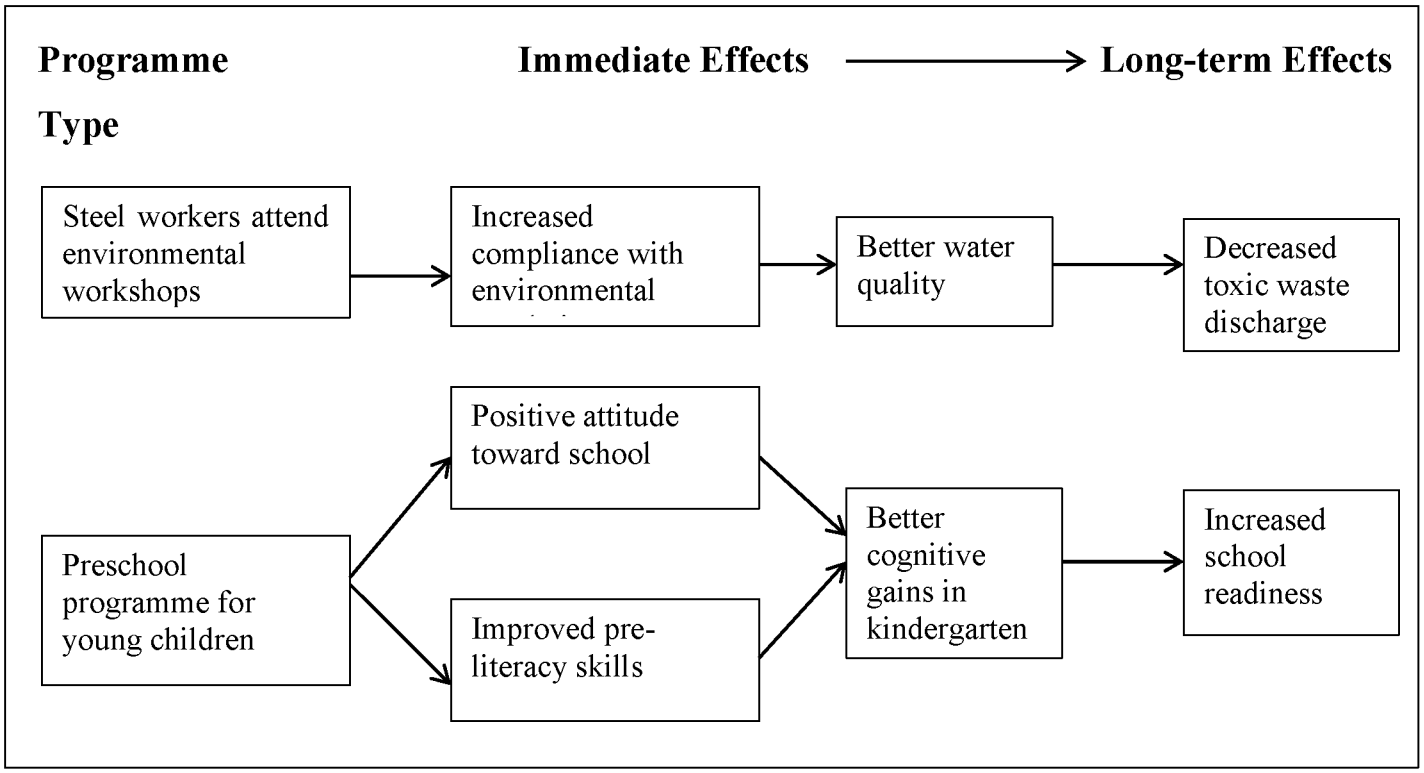


Figure 6.2: Programme effects and immediate effects

(Adapted from Rossi, et al., 2004: 211)

Impacts are not easily measurable and cannot be directly attributed to programme effects. However, they are important factors that result from a programme. The results of impact measures are easier to interpret if information is available on whether direct and immediate outcomes were attained (Rossi et al., 2004). When assessing a programme it is important to identify the outcomes that are closely aligned to the social conditions that a project can influence (Rossi et al., 2004). Outcomes and impacts do not always imply that change has

occurred or that change is positive. As a result, other contextual factors also play a role. When measuring outcomes and impact one needs to measure the degree to which change is a result of the programme (Rossi et al., 2004). For any impact assessment one needs to identify the measurable outcomes that would normally represent the objectives a project is trying to achieve (Rossi et al., 1999). As a result, the outcome and impact themes identified should be aligned closely to project goals. Furthermore, project evaluators should acknowledge that unintended outcomes and impacts might arise.

The frameworks selected for assessing the outcome and impact of Social Programmes, IT/IS Programmes, and ICT4D Programmes presented a number of recurring and correlating themes. Table 6.12 displays these themes from each category of project assessment.

Table 6.12: Emerging themes for outcome and impact assessment

Programme Area	Themes	Sub-Themes	Methods Identified
Social Programmes	**Collective self-efficacy** (DFID, 1999; Figueroa, Kincaid, Rani and Lewis, 2002; Mchombu, 1995)	–	• *Interviews* • *Observations* • *Household surveys* • *Focus group discussions* • *Programme records* • *Anecdotes*
	Well-being (DFID, 1999; Figueroa, Kincaid, Rani and Lewis, 2002; Mchombu, 1995)	*Social cohesion*	
		Attitude, skills and knowledge	
		Health	
		Security	
	Vulnerability (DFID, 1999)	*Food security*	
		Income	
		Employment	
	Natural resource use (DFID, 1999; Mchombu, 1995)	–	
IS/IT Programmes	**Risk** (DFID, 1999; Hallikainen and Chen, 2005)	*Time savings*	• *Questionnaires* • *Interviews*
		Business risk	
	Return on investment (DeLone and McLean, 2003; Hallikainen and Chen, 2005; Rossi et al., 1999)	*Sales volume*	
		Cost savings	
		Financial productivity	
	Strategic value (DeLone and McLean, 2003; Hallikainen and Chen, 2005)	*Market expansion*	
		Competitive advantage	
		Sales Volume *Improved value*	
ICT4D Programmes	**Behaviour change** (Myers, 2005)	–	
	Most significant change (Batchelor and Norrish, 2005)	–	
	Livelihoods (DFID, 1999)	*Health status*	
		Living standard	
		Education	
		Income	

Programme Area	Themes	Sub-Themes	Methods Identified
		Service utilisation	• *Household surveys* • *KABP surveys* • *Tracer studies* • *Interviews* • *Stories* • *Focus groups* • *Participatory observations* • *Theoretical sampling* • *Field notes* • *Delphic surveys*
	Sustainability (Batchelor and Norrish, 2005)	–	
	Empowerment Gigler, 2004)	*Human capabilities*	
		Social capabilities	
		Informational capabilities	

All the themes identified from the three groups (social, IS/IT and ICT4D programmes) share a common goal of bringing about positive change and influencing the social conditions being experienced by stakeholders. Therefore, these themes are interrelated and influence each other. Based on these themes identified sustainability echoes throughout the frameworks. It has become important to initiate more sustainable projects that truly facilitate development and bring about positive change. For IS/IT programmes creating a return on investment and looking at strategic value all aim to sustain a business and ensure it is successful in the long term. While for social programmes use of natural resources, well-being and income all stem from the definition of sustainable development: meeting the needs of the present without compromising the needs of future generations (Brundtland, 1987: 8); therefore, ensuring that there is room for future generations to meet their needs of well-being and income as well. For ICT4D programmes sustainability is distinctly drawn out as a theme. This could be as a result of the many unsustainable and unsuccessful ICT4D programmes that have been created in the past (Unwin, 2009).

As different development or business programmes have different goals they all result in different outcomes and for each outcome certain impacts may evolve. The themes in Table 6.12 comprise a mixture of outcomes and impacts. Some themes are purely outcomes or impacts and some themes can be combined into both categories as they may include sub-themes which do not all belong to one distinct category. Table 6.13 displays the categories to which these themes primarily belong to. Outcomes are known as those aspects of a project that are directly affected as a result of participating in the programme (Rossi et al., 2004). "Return on investment" and "Behaviour change" are considered as outcome themes, as these are most likely to be observed immediately as a direct result of the project. "Well-being", "Natural resource use", "Most significant change", "Livelihoods", "Empowerment", and "Strategic

value" entail sub-themes that belong to both groups. For example "well-being" involves outcomes such as "attitude", "skills", "knowledge" and impacts such as "health status" and "security". The remaining four themes are considered impact themes as they take effect over time and other factors besides the ICT4D initiative influence their development.

Table 6.13: Categories of themes identified

Outcomes (immediate effects)	Outcomes and Impacts (mixed effects)	Impacts (long-term effects)
Return on investment	Well-being	Income
Behaviour change	Natural resource use	Vulnerability
	Most significant change	Risk
	Livelihoods	Sustainability
	Empowerment	
	Strategic value	

All themes together cover a wide range of areas, including economic, social and environmental dimensions. Furthermore, although each category of programmes produced its own set of themes, there are some overlapping areas. "Income" (Social programmes and IS/IT programmes) and "Return on investment" (IS/IT programmes) are economic themes that both involve gaining an increase in net income. "Well-being" (Social programmes) and "Livelihoods" (ICT4D programmes) are closely related as Framework 1 indicates that one's well-being, income, vulnerability and the use of their natural resource base forms a part of their livelihood as these are the factors that have a great impact on one's livelihood. "Behaviour change" and "most significant change" both involve identifying a change that has taken place and it could be that the most significant change resulting from a project is that of a change in people's behaviours. Shocks, trends or seasonality (from Framework 1) that form part of "Vulnerability" (Social programmes) can increase the risks faced by organisations and communities in general; consequently "risk" is associated with "vulnerability". "Strategic value" (IS/IT programmes) involves increasing a business competitive advantage and expanding into more markets. Furthermore, "strategic value" involves creating sustainable business investments, which translates to ICT4D as positioning a community to best achieve their goals and create more sustainable ICT4D initiatives.

It is suggested that from Table 6.13 the emerging themes for outcome and impact assessment can be further collapsed into specific themes for the outcome and impact assessment of ICT for rural development programmes. A summary of the emerging themes is displayed below for the outcome and impact assessment of rural ICT4D programmes.

- *Strategic value* (Frameworks 4 & 5)

  By creating more sustainable ICT4D initiatives, they can be expanded into other areas, brought to scale, and facilitate further development agendas. Furthermore, strategic value would aim to position a community in such a way that communities develop the capacity to achieve human development goals.

- *Most significant change* (Frameworks 6 & 7)

  The most significant change observed within a project should be from the views of those experiencing the actual change taking place; that is, the individual, community or organisation. The aim should be to determine what the greatest change has been since the inception of the project. Such an approach elicits the views of stakeholders and it eliminates overlooking change that might have taken place.

- *Empowerment* (Frameworks 2, 8 & 9)

  Empowerment entails invoking strength, hope, power and confidence in people. In cases of ICT4D initiatives, evaluators should seek to determine how ICTs have empowered community members either through skills innovation, such as, ICT skills or information literacy in health, government, education, etc.

- *Livelihoods* (Frameworks 1, 3 & 6)

  Livelihoods represent one's means of support and living. In the case of ICT4D initiatives the evaluators should determine how ICTs have impacted one's livelihood in terms of influencing income, employment, occupation and one's living.

- *Sustainability* (Frameworks 1 & 3)

  The outcome and impact themes identified should be sustainable to ensure the success of rural ICT projects. Sustainability determines whether the outcomes and impacts identified from a project are sustainable.

6.6.3. Comprehensive Nature of Emerging Outcome and Impact Themes

As defined in previous chapters the comprehensive evaluation of rural ICT entails evaluating a rural ICT project throughout its life cycle based on all appropriate domains of evaluation. From the Rural ICT Comprehensive Evaluation framework (RICT-CEF) seven domains of evaluation in sequential order exist: Baseline Study, Needs Assessment, Programme Theory Assessment, Process Assessment, Outcome and Impact Assessment, Efficiency Assessment and Scalability Assessment. Each evaluation domain applies a different approach of analysis and provides results that can interdependently build on other domains of evaluation (Pade-Khene and Sewry, 2011). Outcome and impact assessment themes identified can build on

preceding domains of evaluation. Therefore, when assessing the outcome and impact of a programme, the Programme Theory Assessment and Process Assessment domains should be evaluated first. The programme theory will determine the expected programme effects while the programme process will show whether and where a programme is well implemented to produce those effects (Rossi et al., 2004).

According to the RICT-CEF, the Baseline Study and Process Assessment domain play a primary role in the outcome and impact assessment domain. The Baseline Study informs the project of the socio economic status of a community and the rural environment, before project activities are initiated. These results can be used when assessing the before-after state of the community (Pade-Khene and Sewry, 2011). The results from outcome assessments provide success criteria and feedback for continuous process assessment to take place. Furthermore, the process assessment aids in fully understanding how and why certain outcomes and impacts have occurred. The outcome and impact assessment domain is also interrelated with the efficiency and scalability domains as well. The themes for outcome and impact should also be assessed for cost benefit and effectiveness, both associated with efficiency assessment. Lastly, such themes should be evaluated to determine the possibilities of scalability and future expansions (Pade-Khene and Sewry, 2011). Most frameworks analysed previously indicated that outcome and impact assessment should not be conducted in isolation from preceding domains of evaluation. Framework 1 and 3 highlighted the need of baseline data to assign causality of outcome and impact themes to the actual development initiative. Framework 4 and 5 highlighted the relationship between the business development process, system quality and the actual outcomes and long-term impacts attained. Framework 6 and 8 highlighted the processes and relationships that lead to achieving outcomes and impacts and therefore their link to other domains of evaluation.

The twelve themes identified from all three categories of assessment frameworks emerged as a result of various factors; either a previous community need/development priority, a means of improving the socio-economic status of a community or for capacity building. Such factors stem from preceding domains of evaluation such as the Baseline Study and Needs Assessment information. Hence, when trying to understand these themes one has to look back at these preceding domains of evaluation and determine how themes evolved from project initiation through to processes, outputs, outcomes and lastly impacts. For example, a community experiencing high rates of diarrhoea may implement an education programme about diarrhoea and health concerns. Inputs and activities for such a programme may include certified

education manuals, free new water disinfectants, videos, and other teaching tools, on diarrhoea cases, symptoms, treatment and prevention (which can be supported by ICTs). Outputs can include community members attending the programme, participating in workshops, and gaining access to manuals and disinfectants. Initial outcomes may include community members being knowledgeable and aware about diarrhoea and health guidelines. Intermediate outcomes may include community members following proper hygiene and health guidelines. Longer-term outcomes (impacts) may include a reduction in the prevalence of the disease within the community.

6.7. CONCLUSION

The following chapter aimed to identify the key themes that should be assessed when evaluating the outcome and impact of rural ICT4D programmes. Social programmes and IS/IT programmes all identified relevant themes that can add value within an ICT4D evaluation. Social programmes provided more social and intangible themes along with economic dimensions that together provide a more holistic evaluation of human development. IS/IT programmes provided themes that are geared towards creating business value and increased profits. Such themes highlight that ICTs too can add value within socio-economic initiatives. The analysis of all articles selected showed areas of commonalities between assessment themes and the various interrelationships that exist between them. From this analysis, five themes for the outcome and impact assessment of rural ICT4D programmes have been identified; namely "Strategic Value", "Most Significant Change", "Empowerment", "Sustainability", and "Livelihoods". The themes of outcome and impact assessment identified would potentially form the core component for an assessment framework that guides the process of evaluating the outcomes and impacts of rural ICT projects.

Chapter 7: A proposed framework for the Outcome and Impact Assessment of Rural ICT Projects in Developing Countries

7.1. *Introduction*

7.2. *A framework for the Outcome and Impact Assessment of Rural ICT4D programmes*

7.2.1. *The Structure of the Outcome and Impact Assessment Framework*

7.3. *Evaluation Guidelines*

7.3.1. *Application of Comprehensive Evaluation*

7.3.2. *Stakeholder Relationships*

7.3.3. *External Environment*

7.3.4. *Ethical Considerations*

7.4. *Critical Themes of Outcome and Impact Assessment in Rural ICT4D projects*

7.4.1. *Strategic Value*

7.4.2. *Most significant change*

7.4.3. *Empowerment*

7.4.4. *Livelihoods*

7.4.5. *Sustainability*

7.5. *Relationship of Themes*

7.6. *Summary of Dependence of Critical Themes on Preceding Domains of Evaluation*

7.7. *Limitations*

7.8. *Conclusion*

7.1. INTRODUCTION

The evaluation of rural ICT projects should demonstrate their positive and negative effects and justify the role ICTs play within human development. The outcome and impact assessment of rural ICT4D programmes is a necessary component of the evaluation of ICT4D programmes. Therefore it is important to provide guidance as to the key aspects of ICT projects that should be assessed to determine the contribution made by ICTs. Key outcome and impact themes provide a base for assessment and still provide enough information to determine the formative and summative assessment of a project. A framework for the assessment of the outcomes and impacts of ICT4D is proposed, which provides guidelines for the critical aspects of a project that should be assessed and taken into account when conducting an outcome and impact assessment of rural ICT4D. Five key themes have been identified from literature. These themes include strategic value', 'empowerment', 'livelihoods', 'most significant change' and 'sustainability'.

The chapter introduces the proposed framework and its components. The evaluation guidelines taken into account for the outcome and impact assessment are then presented. The critical themes that comprise the proposed framework and the proposed assessment methods are then discussed. Lastly the limitations are presented and it is concluded that it is necessary to implement the proposed framework within a case study in order to understand its suitability and shortcomings.

7.2. A FRAMEWORK FOR THE OUTCOME AND IMPACT ASSESSMENT OF RURAL ICT4D PROGRAMMES

7.2.1. The Structure of the Outcome and Impact Assessment Framework

The proposed outcome and impact assessment framework, Figure 7.1, comprises of three main components that guide the comprehensive outcome and impact assessment of rural ICT4D programmes. The main components include the evaluation guidelines to take into consideration when assessing outcomes and impacts, the critical themes of rural ICT4D outcome and impact assessment and the preceding domains of evaluation.

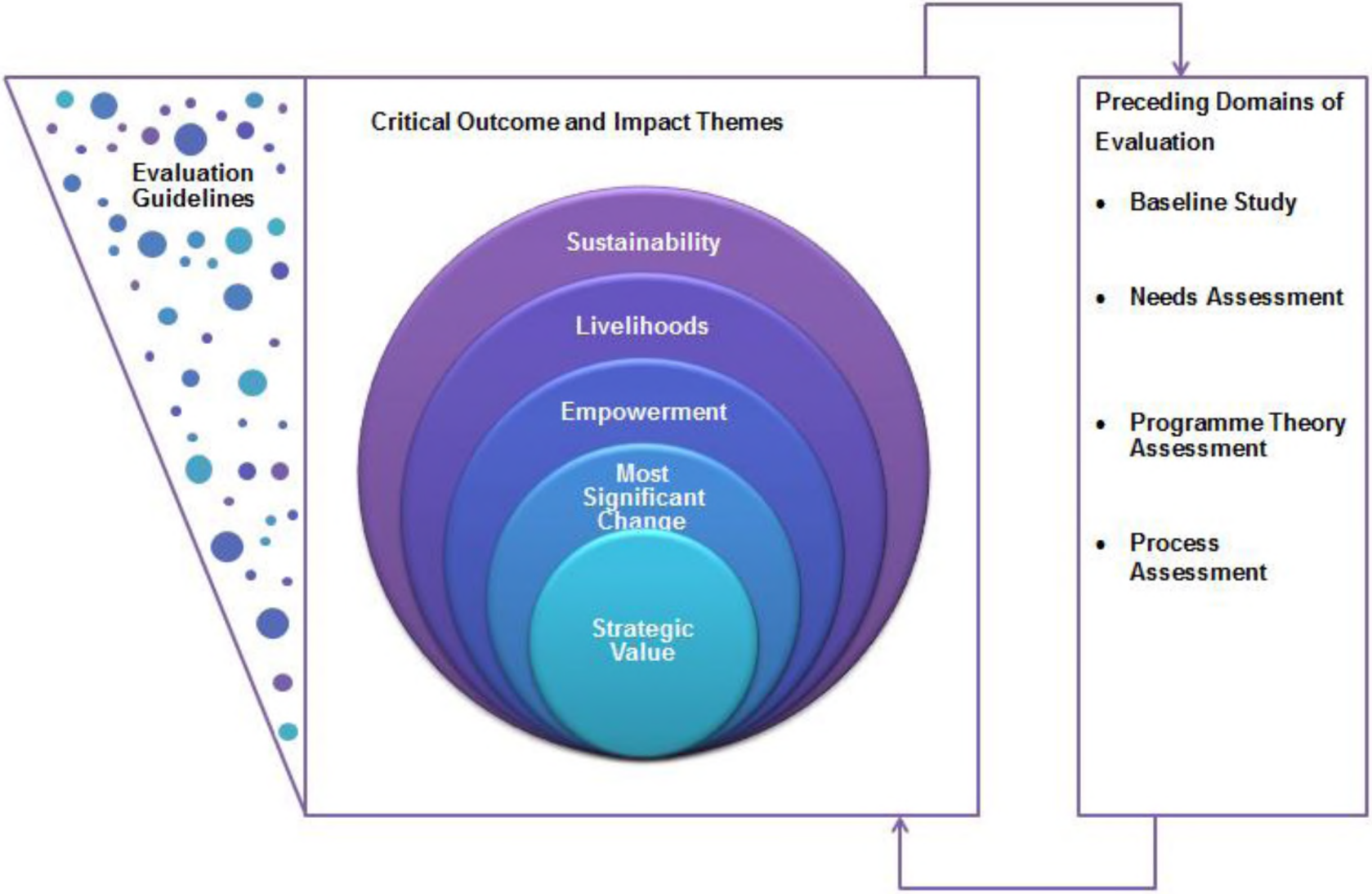


Figure 7.1: Proposed framework for the outcome and impact assessment of Rural ICT4D

The framework highlights the main issues for assessment and how they may interact. The five key themes are presented as a stacked Venn diagram (concentric circles) to demonstrate the overlapping relationships between all themes. The Venn diagram does not indicate importance of themes nor does it show a restrictive sequential process. Instead it demonstrates growth towards sustainable human development as a result of ICTs. The outcome and impact assessment themes are informed by Baseline Data, Needs Assessment, Programme Theory Assessment and Process Assessment data which form part of the preceding domains of evaluation for the RICT-CEF. Moreover the external environment influences the way in which all themes interact and how themes contribute towards human development. All themes are initiated by a set of project outputs as a result of the project implementation and form part of empowering rural communities.

7.2.1.1. Evaluation guidelines

The evaluation guidelines suggest factors the evaluator should take into account when assessing the key themes of the outcome and impact of a rural ICT4D programme. The evaluation guidelines should be applied across all proposed themes. The guidelines also advise how the framework can be used as a comprehensive assessment tool. These guidelines further advise evaluators to consider project stakeholders, the external environment and ethical matters when embarking on such an evaluation (Brunet et al., 2004; Brydon, 2006; Dasuki and Abbot, 2011; DFID, 1999; Duncombe, 2006; Gigler, 2004; Grunfeld, 2007; Krauss, 2009; Rossi et al., 2004).

7.2.1.2. Critical Outcome and Impact themes

The key Outcome and Impact themes represent the critical aspects that should be assessed when assessing the outcome and impact of rural ICT4D projects. Instruments that should be used to conduct the assessment of each theme are also suggested. The themes that have emerged include:

- *Strategic Value*: considers whether the community is equipped to achieve its intended goals.
- *Most Significant Change*: considers the most important change that has taken place within the community as a result of the ICT project.
- *Empowerment*: considers whether project stakeholders have been empowered as a result of the ICT project.

- *Livelihoods*: considers whether the ICT project has positively impacted people's livelihoods.
- *Sustainability*: considers whether the outcomes and impacts identified within a project are sustainable.

Each theme is described according to its Purpose, its Expected Outcomes, its Application to a Comprehensive Evaluation, its Assessment (sub-themes, evaluation questions and methods), and its Relationships with other themes.

7.2.1.3. Preceding Domains of Evaluation

The Preceding Domains of Evaluation describe how the proposed themes form part of a comprehensive rural ICT evaluation, according to the RICT-CEF (Pade-Khene and Sewry, 2011: 326), and how they are informed by and inform preceding evaluations. The domains that are covered include the Baseline Study, Needs Assessment, Programme Theory Assessment and the Process Assessment. These domains all evaluate a particular aspect of a project which adds perspective to the results obtained from the outcome and impact assessment of rural ICT4D projects (Rossi et al., 2004).

7.3. EVALUATION GUIDELINES

7.3.1. Application of Comprehensive Evaluation

According to the RICT-CEF, preceding evaluation results inform the proposed themes for *outcome* and *impact* assessment of rural ICT4D projects. Given long term impacts, it is rather difficult to establish causality between ICTs and human development (Hamel, 2010: 3). Therefore, preceding domain evaluations, as indicated by the RICT-CEF, aid in understanding causality, understanding why certain outcomes and impacts may have occurred, understanding how outcomes have led to impacts and the gap between the two, and the conditions required for certain outcomes and impacts to take place.

In order to holistically understand the outcome and impact of ICTs in rural communities one also needs to take into account preceding evaluations of the ICT project lifecycle. For example: an understanding of the level of support from intermediary organisations; the level at which the community has integrated ICTs and gained ownership of the project; whether the project has responded to community needs; whether the project has provided technical support with regards to capacity building; and understanding the level of engagement of intermediaries and community members throughout the project life cycle. These are all important factors that

enrich the evaluation of ICT4D outcome and impact within rural communities (Gigler, 2004: 22). Therefore, it is important that the themes identified should at least be assessed in alignment with a Baseline Study and a Process Assessment.

A *Baseline Study* explains project goals, broad community needs and the socio-economic status of a community. It provides a platform for a before-after comparison of the community status and whether general community needs have been met as compared to the outcomes and impacts observed. The second domain of evaluation, the *Needs Assessment*, provides a more in-depth assessment of the key needs of a community and therefore the outcome and impact themes identified inform the project whether the solutions proposed to meet community needs were in fact appropriate and adaptable to evolving community needs. The third domain of evaluation, the *Programme Theory Assessment*, assesses whether the project plan is suitable for addressing the key community needs. This domain, therefore, provides a further benchmark for evaluating project performance and the outcomes and impacts that emerge and further understand why particular outcomes and impacts have resulted. The programme theory also provides a basis for the outcome and impact evaluation. Additionally, the results from the outcome and impact assessment would provide an indication as to whether the project design was suitable. The fourth domain of evaluation, the *Process Assessment*, assesses the processes that could potentially lead to particular outcomes and impacts; therefore, providing a more holistic view of the results from the assessment of proposed themes. Furthermore, it assesses whether a project has been appropriately implemented to produce meaningful outcomes and impacts. Reference to this domain will again aid in conceptualising why and how particular outcomes and impacts may have occurred. Moreover, it also serves as a platform to determine whether an outcome and impact assessment is suitable at the time. For example, if the project has not been appropriately implemented and it is not being utilised then it is less likely to demonstrate impact (Khene and Sewry, 2011).

7.3.2. Stakeholder Relationships

It is recommended that all stakeholders contribute towards the assessment process of all the proposed themes. Some stakeholders may play a bigger role than others. Such a case is evident in the assessment of 'most significant change'. For most significant change the project recipients or beneficiaries would play the bigger role as they are the ones who are experiencing the change. Moreover, the instruments used to collect data should be discussed with relevant project stakeholders, such as project champions, project staff and target group recipients, so as to determine techniques that are culturally appropriate and relevant in a particular context

(Grunfeld, 2007: 13). Therefore it is important to plan how the evaluation should be conducted with stakeholders, how the evaluation will be open and participatory and keep participants informed on evaluation progress, and how project outcomes and impacts will be measured (Pade-Khene and Sewry, 2011; Rossi et al., 2004).

Involving all appropriate stakeholders creates a sense of ownership by those affected by the project. The selection of evaluation participants should avoid bias from participants who view that they do not play a key role in the success of the project or perceive that the evaluation of the project may lead to certain effects such as rewards or penalties. Furthermore participants should include minority groups whereby the evaluator ensures the views of minority groups are also included. In addition the evaluator should take note to provide training for participants. Local participants should be equipped to effectively partake in the evaluation process; they need to be informed on how instruments are used and how data can be collected in order to improve the reliability of findings and equip the local participants to take ownership of future evaluations (Khene, 2010: 150; Rossi et al., 2004).

7.3.3. External Environment

Enabling factors and the external environment have an influence on the outcome and impact themes that have emerged from literature. Various factors and resources are needed in order to promote effective change through ICTs. *Access* to ICTs alone is not sufficient for beneficial change to occur. Furthermore, decision making processes that influence the livelihoods of the poor will continue to occur within the local, national and global environment. For example, intermediaries such as the local government and community organisations have a role to play in introducing ICT services to the poor and gradually transfer the management, and technical skills of running ICT initiatives to the local community. As a result, it is important to integrate various levels of analysis and action and demonstrate the impact of ICTs. This can be achieved through acknowledging the external environment. Evaluators should also understand that when conducting impact assessments it is relevant to start at the micro (individual and community) level as it incorporates the real capabilities and requirements of the poor (Dasuki and Abbot, 2011: 2; Duncombe, 2006: 97; Gigler, 2004: 21). The external environment can both positively and negatively influence an ICT4D initiative due to the constantly changing trends, seasonality shifts, and shocks (i.e. natural disasters, fluctuating employment opportunities, technological trends, change in resource availability, and fluctuating prices) that affect communities. It is important to identify and understand these external factors that most affect the lives of the community members and the ICT4D project. Such external factors may change the dynamics

of a community or influence community needs and as a result, the outcomes and impacts that do occur may be considered minor with regards to the new needs. However, if a project is continuously assessed and other domains of evaluation considered, especially the process assessment, then the ICT4D initiative will be adjusted accordingly. Moreover, the new outcomes and impacts that do result are more likely to be meaningful. For example, if a community implements an ICT programme to improve a particular skill in a particular subject, the expected outcomes and impacts should be with respect to that need at the time. However, if the department of education decides to phase out that particular subject and the project has not been adjusted accordingly then the outcomes and impacts that result are less likely to be meaningful. Therefore, without prior knowledge of the changes taking place in the environment, evaluators may incorrectly deem project effects a total failure. This highlights the significance of formulating a comprehensive evaluation of the outcome and impact of rural ICT4D (DFID, 1999: 2).

7.3.4. Ethical Considerations

Eliciting outcome and impact information requires interacting with various project stakeholders and engaging with rural communities. Such interactions should take into account the cultural and contextual features of a community and refrain from abusing communities and stakeholders (Brunet et al., 2004; Krauss, 2009; McNamara, 2003). The outcome and impact assessment results should be shared with all relevant stakeholders through feedback mechanisms, informed consent should be obtained from participating stakeholders and any disclosed information/results should not bring about harm to project stakeholders. One way of ensuring the above is for evaluators to integrate stakeholders in the evaluation process and therefore reduce risk of unethical outcome and impact assessment actions (Brydon, 2006: 27; Grunfeld, 2007: 13; Krauss, 2009). In the long run, outcome and impact assessments of rural ICT4D should aim to benefit the ICT4D initiative and its recipients so as to make meaningful contributions towards meeting rural community needs and human development.

7.4. CRITICAL THEMES OF OUTCOME AND IMPACT ASSESSMENT IN RURAL ICT4D PROJECTS

Critical themes consist of the essential rural ICT4D aspects on which information is gathered when conducting outcome and impact assessments of rural ICT4D programmes. The themes aim to improve the assessment of ICT4D effects on rural communities and provide a point of reference for rural ICT4D assessment. Project stakeholders need to be aware of the intended

and unintended ICT project effects in order to determine their success or failure. To identify these intended and unintended effects, evaluators need to ask critical questions on the project contribution made and how it relates to initial project goals. Furthermore, reference to preceding project evaluations provides more depth and understanding of critical themes. A number of qualitative and quantitative methods can be employed to assess these critical questions. The onus is on the evaluator and project implementers to decide which methods are appropriate given the project context, cost factors, reliability and validity of methods, and time of data collection (Dey, Newman and Prendergast, 2010; Linnan and Stekler, 2002: 18).

The analysis of impact assessment of social programmes, information systems programmes and ICT4D programmes revealed critical themes of outcome and impact assessment that should be applied within rural ICT projects. The five themes identified include: *Strategic Value, Most Significant Change, Empowerment, Livelihoods and Sustainability.* For each theme identified there are a set of immediate ICT4D effects (outcomes) that arise and that may develop into more long term effects (impacts). Based on the ICT4D value chain proposed by Heeks and Molla (2009) outcomes are based on the immediate costs and benefits of the ICT4D project (economic, direct, intended, positive, short term, subjective) whereas the impacts are based on the contribution the project makes towards development goals (social impacts, negative, long term, indirect, unintended, final impacts, objective measures) (Heeks and Molla, 2009; Rossi et al., 1998). *Immediate project outcomes* for all themes identified include gaining the skills and capacity to access and effectively apply information and knowledge to one's given situation. A change in attitude, behaviour, skills, awareness and motivation as a result of ICTs (for example, literacy skills, knowledge on improved farming techniques and health measures and positive attitude towards job search) form part of the *generic outcomes* for each theme. Such immediate outcomes may lead to *long term impacts* such as changes in livelihood, and empowering community members to bring about positive change and achieve a lifestyle they find valuable (Rossi et al., 1998). Evaluators should determine how the application of information and ICTs and the above mentioned outcomes add further value and impact communities. At this point it should be noted that themes are not necessarily always positive. ICT4D projects may result in disempowering people or result in unsustainable outcomes and impacts. Therefore evaluators should be observant for both negative and positive aspects of the themes identified. Furthermore, it is up to the evaluator's discretion to determine which aspects of the proposed framework to apply. This will be dependent on the type of research goals and

context. Aspects of a particular theme may or may not be relevant in any given situation and therefore themes should be contextualised and suited to the particular context at hand.

7.4.1. Strategic Value

7.4.1.1. Purpose

Creating strategic advantage within ICT4D programmes entails enabling individuals and community members to equip themselves so that they are able to achieve the developmental goals they desire. For example, a programme for the sustainable farming of oysters in rural coastal areas may make use of ICTs to facilitate such an initiative. Information and knowledge on sustainable oyster farming and creating community gardens can then be valuable for raising awareness. Moreover, such information can enhance farming techniques that not only reduce environmental burden but also contribute towards food security and alternative income generating means through the sale of farming produce. Through the use of ICTs, information and knowledge can be provided through educational videos, radio campaigns and through print media. In this example, ICTs are being used as a means to better equip and therefore, position community members for efficient farming techniques by equipping them with knowledge and skills that are directed towards increased sustainable farming strategies (Hallikainen and Chen, 2005: 59).

Identifying capabilities that are required to create and maintain a sustainable ICT4D programme and assessing the impact of such capabilities is important for the strategic value of an ICT4D programme. Not only is one then able to determine whether a project is replicable and scalable, but also determine the attributes required for that. Often ICT4D studies focus on the past and what has occurred and tend to overlook assessment from a forward looking perspective (Grunfeld, 2007: 8). Therefore, *Strategic Value* aims to assess a project from a forward looking perspective. It determines the value the programme is adding in order to achieve community objectives, expand the project, and to facilitate further development agendas.

It has often been a case that ICTs are viewed to draw development resources and funds away from more pressing concerns such as health and education; therefore, it is important to justify the role that ICTs play and how a project aligns itself within the broader goals of the community and human development (Hamel, 2010). The assessment of strategic value explores how a community has been positioned and equipped to achieve desirable development goals. For such an assessment it is important to ask how the project has equipped the community in order to

achieve community goals. Strategic value also entails expanding a project into new avenues and assessing the future prospects of the project (Hamel, 2010).

7.4.1.2. Assessing outcomes related to Strategic Value

A useful way to adequately position a community is for the programme outputs to be aligned in such a way that best achieves the project and community goals. For example a community that has a high rate of malaria can introduce an ICT programme that focuses on providing information on malaria and other prevalent diseases in that area (how it is spread, how to minimise malaria cases and treatment of malaria). In this case the project outputs (information on malaria and ways to access that information) are aligned to the community goal of fighting against malaria. Through this process of positioning communities or rural activities, the opportunity to experience new development possibilities and facilitate further development goals is enhanced (Grunfeld, 2007: 8; Hallikainen and Chen, 2005: 59).

Some of the questions the evaluator should consider when assessing the strategic value of the project include:

- How has the project catered for future expansion and taken into account cost factors?
- Does the project cater for unintended effects and adjust accordingly to changing community needs and a changing environment?

As indicated previously the outcomes to assess can be categorised as skills, awareness and knowledge, attitude and behaviour, and motivation. Key outcomes to expect for the assessment of Strategic Value include (Grunfeld, 2007: 8; Hallikainen and Chen, 2005: 59):

- *Skills:* whether community members are being equipped with the necessary skills (informational and literacy skills) that are aligned to achieving long term community goals that the programme aims to address. The evaluator should note that a particular ICT4D programme might only address specific community goals and not all goals the community wishes to achieve. Therefore, the particular project outputs the programme produces such as literacy skills should at least be aligned to those community goals the programme aims to support.
- *Knowledge and Awareness:* whether the local community is aware of the project strategy and how the project plans to move forward in terms of facilitating community goals. Furthermore the evaluator should go a step further and determine whether the project team

is aware of the evolving local needs and how it adjusts its outputs such that there is an alignment with long term community goals they are supporting.

- *Attitude and Behaviour*: whether the outputs (such as access to ICT facilities, literacy training and access to information) of the ICT4D programme trigger a change in attitude and behaviour that influences the attainment of community goals. Some questions to consider include whether there has been a positive/negative change in attitude and behaviour as a result of literacy training and how that relates to community goals. Is there a positive/negative change in attitude and behaviour in terms of the future prospects of the project?
- *Motivation:* whether project outputs motivate people to achieve the community goals being addressed.

7.4.1.3. Dependence on preceding domains of evaluation

Preceding domains of evaluation (preceding evaluations of all stages of a project lifecycle) add value to the overall evaluation of Strategic Value.

- *Baseline Study* and *Needs Assessment*

  The *Baseline Study* and *Needs Assessment* help clarify the project aims and any new emerging (demand driven) community needs that are being addressed. These needs can be matched to the observed outputs to determine whether outputs are suitable for achieving the project aims and overall determine whether a community is being adequately positioned to achieve their goals.
- *Programme Theory Assessment*

  Information from assessing Strategic Value can enhance the Programme Theory Assessment at a later iteration of the project (especially considering projects taken to scale) as it confirms whether the project design is suitable to best achieve project and community goals.
- *Process Assessment*

  The Process Assessment would provide useful data on why particular outputs have been targeted in order for the project to fulfil its intended role to address community needs.
- *Scalability Assessment*

  As mentioned earlier Strategic Value provides meaningful data on the alignment of project activities and community goals, and the future plans for the project which can be useful for scalability purposes.

7.4.1.4. Assessing Strategic Value

To assess the positioning of a community it is essential that the evaluator is aware of the current project outputs. It should then be determined whether these project outputs are enabling a community to achieve their goals. Therefore, there should be some alignment between output and community goals the project wishes to address. However, it should be noted that unintended effects can emerge from an ICT4D intervention. The evaluator should take into account the possibility of community members being equipped, for example, with skills that address community needs beyond the project scope. The following should be considered for assessing *Strategic Value:*

- How the project has equipped a community to achieve their goals.
- The plans for developing the project in the near future in relation to equipping community members to achieve their goals.

Proposed Assessment Instruments

Assessing the positioning of an ICT4D programme would require employing various instruments, outlined in Table 7.1, such as; documentation of preceding evaluations, questionnaires, participant observation and interviews with stakeholders from all levels of the project.

Table 7.1: Possible instruments for assessing Strategic Value

Instrument	Description
Questionnaires (Hallikainen and Chen, 2005)	Questionnaires provide a general view on whether community members are aware of the project activities and how those activities may translate into the achievement of community goals.
Interviews (Hallikainen and Chen, 2005)	It is important to engage particularly with project management and understand how the project plans to move forward. This can be achieved through in depth interviews with the project team, management and project champions as they are the best informed about the strategy being used and the type of outputs the project is targeting. Focus groups interviews provide a platform for project stakeholders to express their views on whether project outputs equip them to achieve their goals (for example prospective empowerment and livelihood goals) and how. Furthermore, the community could provide suggestions on alternative outputs that could better equip them for future reference.
Participant observations	Through participant observations during project activities such as literacy training the evaluator is in a position to reflect on the current project outputs and how they relate to community goals. Additionally participant

(Figueroa, Kincaid, Rani and Lewis, 2002)	observations provide the evaluator an opportunity to observe how people engage with those project activities. For example, an ICT4D programme might be aimed at facilitating the management of a health issue within a community. Project outputs such as ICT literacy training and capacity building should then be aligned towards achieving better health management. Merely teaching the local community on how to use ICTs does not guarantee that people will make use of them to gain more information on the particular health issue at hand. Furthermore, a process of participating in project activities and taking into account updated needs assessments could be useful in determining how an ICT4D initiative is aligning itself for future changes and new emerging development agendas.
Documentation (Rossi et al., 1999)	Documentation of preceding evaluations of a project life cycle would provide background on how project activities and outputs may have led to a community being positioned. Moreover, general project documentation on its background and project activities informs the ways in which project beneficiaries are being equipped to achieve their goals.

7.4.1.5. Relationship with other themes

Strategic value relates closely with all other themes as it sets off a ripple effect of positioning a community to realise potential outcomes and impacts from the project. How a community is positioned and the future plans of the project will determine the *most significant change* that takes place, the level of *empowerment* attained, the *livelihoods* that are affected and whether these outcomes and impacts are *sustainable* for the future.

7.4.2. Most significant change

7.4.2.1. Purpose

The following theme aims at identifying the most significant change that has come about as a result of the project. Most significant change allows for open ended dialogue and therefore, enabling unexpected outcomes and impacts to emerge. This theme aims to elicit a variety of information, from project recipients, that is not bound by a particular focus area such as a financial focus, an empowerment focus, a political focus, a livelihood focus, and cultural focus. Project recipients would reflect on their project experiences with particular emphasis on the changes that have taken place within the community that they view as most important (Batchelor and Norrish, 2005: 35; Grunfeld, 2007: 14).

7.4.2.2. Assessing outcomes related to Most Significant Change

Outcomes for most significant change would entail important changes, in the views of project stakeholders, which have taken place in terms of people's skills, knowledge, attitude, awareness, behaviour, and motivation. The following should be taken into consideration:

- *Skills*: what has been the significant change with regards to peoples ICT and information literacy skills?
- *Knowledge and Awareness*: what have been the significant changes in raising awareness through ICTs based on a particular project aim or community problem being addressed by the ICT4D project?
- *Attitude and Behaviour*: what have been the changes in attitude and behaviour towards ICTs and achieving community goals being addressed?
- *Motivation*: what has been the greatest motivation experienced in people as a result of taking part in the ICT4D programme or hearing about the programme?

7.4.2.3. Dependence on preceding domains of evaluation

The *Most significant change* that is experienced would be best understood with reference to preceding domains of evaluation.

- *Baseline study* and *Needs assessment*

  The Baseline Study and Needs Assessment provide a means to compare the changes that have taken place and the actual needs being addressed by the ICT4D project.
- *Programme theory assessment*

  Assessment of most significant change would uncover whether the conception of the project is suitable depending on whether the changes experienced are positive and in-line with what the community desires.
- *Process assessment*

  The Process Assessment would provide details as to the various processes that have taken place and therefore, resulted in the most significant changes that have been experienced by the community. Furthermore, the evaluator would then be able to understand why particular changes may have been considered important.

7.4.2.4. Assessing most significant change

Assessing *most significant change* requires participatory methods that seek to gain understanding from the events that have taken place rather than being based on indicators. For assessment purposes the aim is to determine from all stakeholders what the greatest change has been since the project inception.

Proposed Assessment Instruments

Unstructured interviews and story-telling are suitable for such an assessment (Batchelor and Norrish, 2005: 35; Department for International Development, 2005: 23; Grunfeld, 2007: 14). Table 7.2 outlines the instruments for the assessment of Most Significant Change.

Table 7.2: Possible instruments for assessing Most Significant Change

Instrument	Description
Focus group (Batchelor and Norrish, 2005: 35; Department for International Development, 2005: 23; Grunfeld, 2007: 14)	Unstructured interviews with stakeholders would provide accounts of what they view as the most significant change that has taken place and why. The structure of the interviews would be open ended to allow a more detailed account of the changes experienced within the community.
Story-telling (Batchelor and Norrish, 2005: 35; Department for International Development, 2005: 23; Grunfeld, 2007: 14; Myers, 2005)	Story-telling would involve obtaining stories from stakeholders about the major changes they have experienced within the project and then compile, analyse, and verify these stories. Stories often provide a rich description from the point of view of the community members. Furthermore, such an assessment identifies unintended outcomes and it may aid in identifying why a particular change has occurred.

7.4.2.5. Relationship with other themes

Most significant change differs from other themes as it does not assess a project through a particular lens. As it is a collection of stories of people's experiences with the project such experiences/stories may overlap with other proposed themes as well. For example the most significant change that takes place can be that a community was adequately positioned to attain certain goals. Furthermore, the most important change that is experienced may be in the form of empowering community members or in the form of a change in livelihoods of community members. As a result most significant change is closely linked to and forms a part of *strategic value, empowerment,* and *livelihoods.*

Most significant change provides rich qualitative accounts of people's views; however often such views may downplay the negative effects experienced. Therefore, it is recommended to also take into account specific indicators as well (such as those that will be discussed under *empowerment* and *livelihoods*) (Parkinson and Ramírez, 2006: 3).

7.4.3. Empowerment

7.4.3.1. Purpose

Empowerment can be seen as the ability to positively transform people's lives. It involves expanding people's knowledge, enhancing people's confidence, enhancing their decision making, and enhancing their access and management of resources. Within each of these spheres ICTs can play a role (Gigler, 2004: 2; Rabaya, 2009: 4; Wieman et al., 2001: 10; World Bank Group, 2012: 41). Alsop, Bertelsen and Holland (2006: 1) define empowerment as:

> *The process of enhancing an individual's or group's capacity to make purposive choices and to transform those choices into desired actions and outcomes.*

This capacity to make and transform choices is influenced by two factors; namely agency and opportunity structure (Alsop et al., 2006: 10). In terms of empowerment *agency* involves making intentional choices and having the ability to bargain with institutions in the market, civil society and the state. A person's agency or community's agency can be viewed as being dependant on the assets/capitals (psychological, organisational, natural, social, physical, financial, and informational) people or communities possess (Alsop et al., 2006: 13; DFID, 1999: 4). However, even if people have the capacity to make choices they might not use that capacity effectively. People's choices and capacity to make choices is influenced by the *opportunity structure* (Alsop et al., 2006: 11; Gigler, 2004: 7). The *opportunity structure* influences people's ability to transform their choices into action. It is the external context/ institutional (made up of institutions that govern behaviour and also influences the effects of people's/group's choices, that is, law, public services, private organisations, markets, informal cultural practices and value systems) context within which one lives, works and makes choices. Together agency and opportunity structure have the potential to bring about different levels of empowerment.

There is no direct causal relationship between ICTs and empowerment. ICTs can affect the lives of people simultaneously in the economic, social and political realms; therefore it should be noted that the relationship between ICTs and empowerment is constantly being influenced by the dynamics of technology within the social, economic and political context (Gigler, 2004: 5).

The fundamentals of empowerment are reflected in Sen's capability approach whereby human development is viewed as expanding people's capabilities and achievements. This includes expanding what people are capable of doing and being given the resources they have available.

In order to evaluate the effects of ICT4D towards empowerment of people, one needs to understand how information and knowledge enhances individual and collective capabilities to achieve improved economic, social and political opportunities and therefore a better lifestyle (Gigler, 2004: 9; Grunfeld, 2007: 10). Such an approach relies on the basis that the capability of individuals and groups to achieve a lifestyle of value is influenced by their resources (capitals) of which "informational capital" is a part (Gigler, 2004: 9). In this sense, expanding people's capabilities is seen as the process of strengthening their assets/capitals and agency (bargaining power or decision making). Meaningful use of ICTs and enhanced ICT skills can enhance people's capabilities to make economic, social or political life choices, and therefore enhance their power over important areas in their lives and contribute towards their empowerment. Therefore information can act as an agent to strengthen people's assets in multiple ways (Alsop et al., 2006: 17; Gigler, 2004: 9; World Bank Group, 2012: 43; World Bank Group, 2012: 41).

Providing access to ICTs only represents the potential to enhance the capabilities of individuals and does not necessarily lead to positive outcomes on empowerment. However, the ability to make decisions and negotiate will determine whether an increase in resources such as ICTs can be used to expand people's way of living (or expand the 'things' they value) (Gigler, 2004: 5). It is important to note that the outcome and impact indicators for empowerment should be based on the goals and development priorities of the community members themselves (Alsop et al., 2006: 13; Gigler 2004: 7). It is suggested that ICT4D programmes should assess whether ICTs have enhanced people's lifestyles through either strengthening their *informational, social* and *human capabilities* (Gigler, 2004: 13). Therefore for each capability the evaluator should consider agency, opportunity structure and the different levels/degrees of empowerment that could occur. Empowerment indicators should include measuring (Alsop et al., 2006: 17):

- *Agency*: measuring whether psychological, informational, organisational, material, financial and human assets have been enhanced
- *Opportunity structure*: measuring whether formal and informal rules are present and acted upon.

- *Level of empowerment*: measuring whether there are choices that are available; whether a choice has been made or used and whether a particular choice has been achieved (that is, desired results)

Measuring individual or community assets and the opportunity structure provides indirect means of measuring empowerment; whereas direct measures for empowerment would entail understanding the different levels/degrees of empowerment.

7.4.3.2. Assessing outcomes related to Empowerment

In most cases the outcomes of ICTs are the psychological empowerment of the poor. Psychological empowerment is important in enhancing one's ability to influence life decisions which are important for empowerment. The positive effects of ICTs on psychological empowerment can also influence one's life in other aspects which may result in long term impacts at a later stage. For example, ICTs play a role in enhancing one's self-esteem. This is often achieved through a process of reflecting and critically analysing oneself, which may enhance their confidence and ability to seek employment, and therefore may influence the economic aspects of their life. Based on the general outcome themes the evaluator should take in consideration (Gigler, 2004: 13; Grunfeld, 2007: 13, Rossi et al., 1998: 238):

- *Skills*: whether people have been equipped with the relevant informational skills such ICT and information literacy. Furthermore, have they been equipped with the capacity to effectively make use of ICTs available and enhance their entrepreneurial, engagement, and management skills.
- *Awareness*: whether people have become more aware of political issues, social services, and their cultural identity within the community. Are they aware of the possibilities of choices (choices pertaining to things they value) being available to them?
- *Knowledge, Attitude and Behaviour*: whether the use of ICTs has affected people's knowledge pool and their ability to analyse and resolve problems. Have ICTs enhanced their involvement in the current world. Are people making use of the choices (choices pertaining to things they value) available.
- *Motivation*: whether people's self-esteem and confidence has been affected. Whether people have been motivated through the use of ICTs to bring about change within their lives and communities.

7.4.3.3. Dependence on preceding domains of evaluation

Through a process of reflecting on the Baseline Study and the Needs Assessment, the evaluator is able to understand how agency and opportunity structure has changed overtime based on the initial status of the community and what the community needed. Furthermore the baseline data and needs assessment can contribute to identifying outcomes and impacts related to empowerment that should be assessed; therefore contextualising the assessment. The Programme Theory Assessment provides a benchmark to compare the levels of empowerment achieved with programme performance. This further provides an indication of whether the ICT project's design is sound to achieve various levels of empowerment (expected and unexpected). It aids in understanding whether the project was adequately designed to achieve agency and positively influence the opportunity structure. Reflecting on the Process Assessment will aid in understanding why certain choices have been made or not made in terms of the levels of empowerment; for example, why information from ICTs has not been applied to one's context, in other words why have people not been empowered to apply and effectively use the knowledge and information gained, and how information and knowledge from ICTs have influenced people's choices, power dynamics and information flows within communities. Through an understanding of the way the *baseline* data, *programme theory*, and project *processes* influenced programme outcomes and impacts, this adds value to lessons learned (Rossi et al., 2004).

7.4.3.4. Sub-themes for Empowerment

7.4.3.4.1. Enhanced informational capabilities

Informational capabilities seek to understand the extent at which ICTs enhance people's informational assets and the related human and social assets. An assessment of informational capabilities is important seeing that strengthening informational capabilities can strengthen other forms of capabilities to achieve a lifestyle of value. Informational capabilities functions across both human and social capabilities as it is able to strengthen other dimensions of empowerment. Therefore, it is important to highlight this capability as its own separate yet interdependent dimension of empowerment.

Assessing Informational Capabilities

Data on information literacy, use of information, and production of information by community members will inform ICT4D programmes whether meaningful use of ICT services is taking place; therefore enhancing one's informational capabilities (Gigler, 2004: 14; Wieman et al., 2001: 10). Such data can be accessed from a process assessment. It informs project teams on how information and knowledge act as a multiple agent for strengthening different capitals/assets; therefore, increasing one's capacity to make choices. Furthermore, it is useful to understand whether information and ICTs have an impact on the community as a whole in terms of other related capabilities such as social capabilities. Three key indicators to be aware of include:

- *Enhanced information literacy through ICTs*

  Information literacy entails accessing information efficiently and effectively, evaluating information, incorporating it into one's knowledge base, and being able to process and share that information. Furthermore, information literacy entails being able to identify different sources of information, generating and creating own content; for example, through the creation of own websites, and posting material onto the Internet (Gigler, 2004; Wieman et al., 2001).
- *Enhanced ability to make use of, produce, and disseminate information*

  Skills are important not only to access information, but to evaluate information, and effectively make use of that information. Moreover, the process of how information flows within the community is relevant when determining the role ICTs may have played in that process. Understanding information flows aids in determining whether there has been a change in the information exchanges that take place within the community and which types of communications have increased or decreased (Gigler, 2004; Wieman et al., 2001).
- *Enhanced traditional information systems*

  Building on and strengthening traditional information systems within the community, is another useful indicator for determining whether informational capabilities have been strengthened. It is useful to know the extent to which existing community structures have been affected as a result of the project. For example, has there been a convergence of new ICTs such as the Internet and older ICTs such as radio and word of mouth communication within the community.

Proposed Assessment Instruments

Documentation, participant observations, questionnaires and interviews could be employed to determine the use, dissemination and generation of information suited to a particular context (Department of International Development, 2005: 12; Gigler, 2004: 14).

7.4.3.4.2. Enhanced human capabilities

ICTs have multiple effects on people's human capabilities (economic, political, cultural, and human capital). Therefore, it is important to base the assessment on the evaluation of the actual and realised uses of ICTs. For example, in order to understand whether ICTs have enhanced people's capability to improve their income, one needs to understand people's purpose and patterns of using ICTs (Gigler, 2004: 13). It is useful to understand user behaviour and perceptions, and motivation for using ICTs in order to understand whether they have led to an improvement in people's human capabilities. Consequently, assessing the enhancement of human capabilities also relies on data from a Process Assessment (phase 4 of the Rural ICT Comprehensive Evaluation Framework), which incorporates data on ICT use and user perceptions.

The Alternative Evaluation Framework proposed by Gigler (2004; 2015) identified six dimensions for the analysis of individual human empowerment (enhanced human capabilities). The following dimensions have been considered: psychological, human capital, economic, political and cultural dimensions. The impact of ICTs on these dimensions is dependent on how ICTs are integrated and used to achieve one's goals. All these dimensions contribute in one aspect or another to the empowerment of individuals to achieve the goals they value.

Assessing Human Capabilities

Enhanced human capabilities assesses the extent to which ICTs facilitate and support the capacity to solve problems, strengthen ICT skills and knowledge, strengthen the ability to interact with the market at the local level, interact with different aspects of society, improve one's involvement in decision making at the community level, and strengthen people's cultural identity (Gigler, 2004: 15). Key assessment dimensions to be aware of include (Gigler, 2004: 13):

- *Psychological*

  This particular dimension is useful in strengthening one's human agency which is important for empowerment (Gigler, 2004: 13). Psychological empowerment interacts with other aspects of one's life and therefore, adds intrinsic value in different spheres of their lives. Psychological empowerment would look at:

- one's improvement in their ability to analyse and solve problems
- an improvement in one's self-esteem
- an improvement in one's participation in the modern world.

- *Human capital*

  When analysing how ICTs enhance people's human capital, evaluators should take note of the extent ICTs have enhanced people's ICT management and leadership skills. Managerial and leadership skills entail skills that allow for the effective and efficient management of ICT4D supported initiatives such that social and financial sustainability of such programmes is attained (Gigler 2004: 14). With this in mind an assessment of the following indicators would be recommended:

  - The level at which the local community has attained the responsibility of managing technologies and the skills to manage the ICT4D supported programme.
  - The transfer of the day-to-day activities to the community itself in order to acquire those leadership and management skills.
  - Improved ICT literacy and technology skills.

- *Economic*

  The effect of ICTs on the economic dimension of one's life relies on the integration of ICTs into people's lives to achieve development goals. It assesses whether the capacity to interact with the market has been improved. Indicators to take into account include:

  - Improved access to the local market
  - Improved entrepreneurial skills
  - Improved opportunities for income
  - Improved opportunities for employment
  - Strengthening of productive assets such as agricultural assets.

- Political and Cultural

  Much like the economic dimension, the political and cultural dimensions assess the extent to which the community makes effective use of ICTs as tools to achieve their personal political and cultural goals. How well ICTs are being integrated into political and cultural activities is important for this analysis. Indicators for these dimensions could include:

  - Improved access to government services and information
  - Improved ability to engage with the local government
  - Increased awareness on political issues
  - Increased awareness of own cultural identity

- Use of ICTs to express one's culture, for example, designing own websites.

Proposed Assessment Instruments

Through a process of qualitative methods such as focus groups, questionnaires and participant observations evaluators should determine whether the identified ICT uses have led to some form of positive change.

All the qualitative methods aid in understanding how and why certain changes related to human capabilities have taken place (Batchelor and Norrish, 2006: 35; Department of International Development, 2005: 28).

7.4.3.4.3. Enhanced Social Capabilities

A key dimension of community empowerment is enhanced social capabilities. Assessing social capabilities encompasses similar dimensions to that of human capabilities at a much broader perspective that incorporates the community. Poor communities at times gain power through forming groups and attaining a shared vision and goal (Gigler, 2004: 16). It should be noted that existing social norms should be understood and taken into account in order to understand the power relationships that exist between different community groups (Gigler, 2004: 17). Such an understanding helps illuminate how ICTs may have impacted these relationships. For example, with regards to education one should assess the relationships between teacher and students, and parents and students as a result of ICT usage and the effects on these power relationships. Students might be more technology aware than parents which may influence their interaction with elders, for example seeking advice via social media rather than from parents (Gigler, 2004: 19).

Assessing Social Capabilities

Social capabilities assess the extent to which access to and quality of basic services has improved, economic opportunities have been promoted, participation in the political system has improved, and whether the community's identity has been enhanced (Gigler, 2004: 19). In order to assess social capabilities it is important to understand the information flows between community organisations and within the community, the access to and knowledge of social programmes, the economic opportunities created, and understanding the extent to which ICTs utilise indigenous language and knowledge. As indicated by Gigler (2004: 18) key assessment dimensions to be aware of include:

- *Organisational*

  The organisational dimension assesses the effect of ICTs on the social institutions within the community. The aim is to determine whether or not the ICT programme has strengthened existing community organisations. Indicators to take into account include:

  - Improved efficiency of community organisations for example, the communication flows between the community and community organisations
  - Improved communication flows and the exchange of knowledge between community organisations. For example, if school principals make use of email to improve communication with the department of education.

- *Social development*

  Social development aims to assess whether there has been improved access to basic social services such as health and education. Indicators to incorporate include:

  - Improved access to social programmes such as health, education and e-government services.
  - Improved knowledge of social programmes such as health, education and e-government services.

- *Economic development*

  Economic development assesses whether community members have been empowered to access new economic opportunities or improve access to existing economic opportunities such as micro-finance schemes. Indicators for the economic dimension may include:

  - Improved access to the market.
  - Improve productive activities such as farming activities.
  - Improved access to sources of income, for example, improved communication with migrant workers to send money home.

- *Political participation*

  Political participation aims to improve participation of community members within the political system and improve the transparency of communication flows within and between communities. Indicators for political participation may include:

  - Improved transparency of information flows within the community. For example, how community leaders have been elected and how such information is disseminated.
  - Ability for community members to influence their decision making process.
  - Ability to coordinate political work with different communities.
  - Improved transparency of government services through e-government services.

- Ability for community members to be heard.

- *Cultural identity*

  Cultural identity assesses the extent the cultural identity of the community has been strengthened or undermined as a result of ICTs. It is also important to understand whether the community has acquired the skill to own and manage the ICT programme. The evaluator may take into account the following indicators:

  - Whether the ICT centre itself has been incorporated within the community. For example whether the centre is used as a social gathering for other activities other than the use of ICTs.
  - Whether the community makes use of ICTs to express their own cultural identity. For such an analysis it is important to understand how ICTs have been introduced within the community and whether trust has been gained to integrate these ICTs as a way of promoting community culture.
    - Whether ICTs are making use of indigenous languages
    - The manner in which indigenous knowledge is being strengthened
    - Whether there has been an improvement in the sharing of knowledge on the community's culture.

Proposed Assessment Instruments

For the assessment of social capabilities a variety of instruments can be employed. Interviews, focus group discussions and documentation of preceding evaluations will aid in understanding the social and communication dynamics of a community as a result of ICTs.

Proposed Assessment Instruments for all Sub-themes of Empowerment

Possible instruments for assessing Empowerment are outlined in Table 7.3

Table 7.3: Possible instruments for assessing Empowerment

Theme	*Instrument*	**Description**

Informational Capabilities (Department of International Development, 2005; Gigler, 2004)	***Questionnaires***	Questionnaires will provide an overview on whether the capability of using various ICTs has improved, such as improved skills in searching information on the Internet and decision making. Questionnaires can also be used for target participants to indicate whether they share information content and how that content is shared.
	Interviews	Interviews could be further employed to elicit data on how the target population evaluates information and apply it to their own context. Interviews aid in eliciting data on whether capacity to produce public content has improved, whether traditional/existing information systems have been strengthened or how information exchanges have been affected, and whether communication flows between and within communities has improved. Interview sessions would also give the target participants an opportunity to express how information content is shared within their community and how they make use of different sources (if at all) to access information.
	Participant observations	Participant observations require the researcher to partake in the context under investigation which makes it a useful way of further determining how information is used and applied within communities. Such observations could include taking part in ICT literacy training sessions. Participant observations may also be used to determine how information is accessed as target participants make use of ICTs.
	Documentation	Documentation of preceding evaluation information pertaining to use and information literacy can be obtained from a process assessment of the ICT4D initiative. The process assessment captures data on information access, ICT use and user perceptions. Such data is beneficial when determining the effect of ICT use, and understanding how information has been incorporated in one's knowledge base and adapted to one's personal life.
Human Capabilities (Batchelor and Norrish, 2006; Gigler, 2004)	***Questionnaires***	Questionnaires in the form of surveys will be useful in identifying information on the different dimensions for human development (informational, psychological, economic, political and cultural dimensions) on a much broader scale. Furthermore questionnaires will aid in identifying key areas that can be further explored during focus group discussions.
	Focus groups	Focus group discussions and in-depth interviews provide an informal discussion to elicit information related to human capabilities. Information on how people interact with the market (access to markets, improved entrepreneurial abilities, and employment opportunities) and how it has changed due to ICTs will determine whether the economic dimension of human capabilities has been enhanced. Eliciting information on whether access to local government and the ability to interact with local government will aid in understanding whether the political dimension of human capabilities has improved
	Participant observations	Participant observations may reveal information on how people use ICTs as a way of expressing their culture for example, through the design of websites and interfaces.
	Documentation	Documentation of the process assessment in particular will be beneficial in determining the user behaviour and perceptions of community members and whether the identified uses have led to improvements in their lives. Such information will add value to the focus group discussions as to how the ICT usage patterns have led to a process of empowerment of people within their economic, cultural, political and psychological dimensions.
Social Capabilities	***Questionnaires***	Questionnaires in the form of surveys will be useful in broadly identifying information on the indicators for enhanced community empowerment. Furthermore, questionnaires will aid in identifying key areas that can be further explored during the focus group discussion.

(Figueroa, Kincaid, Rani and Lewis, 2002; Gigler, 2004)	***Focus groups***	Through focus group discussions with community members the evaluator can elicit information on how communication networks between organisations/communities have been affected as a result of ICTs; whether information flows have improved and how access to services (education, health, and other social programmes) has changed as a result of ICTs. Focus group discussions may reveal information on community members accessing new/improved economic opportunities such as improved productivity as a result of enhanced knowledge; participation in the community developmental process, increased transparency of community information flow and enhanced decision making. These aspects all aim to provide assessment information assessing enhanced social capabilities.
	Documentation	Baseline data from a baseline assessment will aid in understanding community information flow prior to the project being implemented. Such data will enable an evaluator to determine whether social capabilities have been strengthened and therefore, contribute towards empowerment. Documentation of the process assessment would further provide information on the use of ICTs as a means to facilitate communication flows within the community. Such data will aid in understanding the effects on ICTs on the information systems within the community.

7.4.3.5. Relationship with other themes

- *Livelihoods*: Empowerment revolves around increasing the capacity to make choices and transforming those choices into desirable outcomes. Through that process of empowerment people are then able to achieve desirable livelihood outcomes and impacts. The levels of empowerment identified within a project may provide an idea of what livelihood effects to expect as a result of the project.
- *Most significant change*: The findings from assessing empowerment may identify changes within the community that have contributed towards the most significant change identified.

7.4.4. Livelihoods

7.4.4.1. Purpose

One's livelihood can be broadly defined as a means of making a living (Parkinson and Ramírez, 2006: 4). Chambers and Conway (1991: 1) indicate that "a livelihood comprises people, their capabilities, and their means of living, including food, income and assets (including both material and social resources)". Livelihoods are influenced by the vulnerability context (external environment) in which one resides. The vulnerability context comprises various trends, seasonality and shocks (for example, economic trends, natural and human health shocks and seasonality of employment opportunities). These all have a direct impact on people's assets and the various strategies they have available to achieve the livelihood objectives they desire.

These livelihood objectives are what people seek to achieve and can change depending on the context, time, environment and people. Therefore, a community should define which livelihood objectives are most important to them as the evaluator should not assume they know exactly what the community needs (DFID, 1999; Duncombe, 2006: 83; Parkinson and Ramírez, 2006: 4).

Gigler (2004: 14) notes that the enabling environment or the overall socio-economic and political context of the poor is important in enabling communities to improve their lives through the use of ICTs. People have no direct control over the vulnerability context; however, there are some ways in which to manage this context by enabling people to resist the negative effects and leverage the positive ones. This can be achieved through enhancing assets/livelihood building blocks (human capital, natural capital, social capital, physical capital, financial capital, and informational capital), and the livelihood strategies and resources people employ to make use of those assets to achieve a lifestyle they value (DFID, 1999: 4; Gigler 2004:6). Livelihood strategies can be defined as "the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals (including productive activities, investment strategies, reproductive choices, etc.)" (DFID, 1999). To make use of information and ICTs in such a manner that enhances one's livelihood it should be noted that further resources will be required. Physical resources such as financial resources, skills, infrastructure and social resources such as knowledge, motivation and trust are necessary to access information and knowledge gained from ICTs. Moreover, these resources are required to evaluate the credibility of such information and knowledge, apply information and knowledge gained to a particular context, and take action based on the information provided (Duncombe, 2006: 85).

It is important to understand how ICTs have affected or led to improved livelihood objectives. In other words, how have ICTs affected the way people live their lives, protect themselves against vulnerability and provide new opportunities for an improved future? Much like empowerment, assessing livelihoods would look at how ICTs have aided in building people's capitals and enhanced/interacted with their livelihood strategies to achieve desired livelihood objectives and overall enhanced their livelihoods (DFID, 1999; Duncombe, 2006: 83; Parkinson and Ramírez, 2006: 4).

7.4.4.2. Assessing Outcomes related to Livelihoods

Livelihood outcomes include psychological factors (awareness, motivation, attitude and behaviour), as a result of the ICT4D programme, that may influence the livelihood strategies that community members employ. Much like *empowerment* the effects of ICTs on the psychological factors of human capital can influence other spheres of one's life through enhancing their decision making capacity pertaining to their way of life. Key outcomes to expect for the assessment of Livelihoods include:

- *Skils*: The evaluator should take into account whether people have been equipped with the relevant skills necessary to enhance their livelihood strategies (activities one engages in or choices one makes to achieve their livelihood goals). Some useful questions to ask include:
  - Are people able to access relevant livelihood information based on the livelihood goals they seek?
  - How has the ICT4D project enabled or hindered one's ability to achieve their livelihood objectives?
- *Knowledge and Awareness*: The evaluator should take into account whether people have become more aware of alternative livelihood strategies available to them (for example alternative ways to enhance learning in the classroom through the use of ICTs). Furthermore, have people become aware of alternative factors that can reduce their vulnerability and enhance their current asset pool?
- *Attitude and Behaviour*: The evaluator should take into account whether ICTs have positively influenced people's attitude and behaviour towards new opportunities in terms of their livelihood strategies or minimising the effects of the vulnerability context.
- *Motivation*: The evaluator should take into account whether people have been motivated through the use of ICTs to seek new livelihood opportunities and mitigate livelihood risks.

7.4.4.3. Dependence on preceding domains of evaluation

The following domains of evaluation should be considered:

- *Baseline Study and Needs Assessment*

  Data from the *Baseline Study* and the *Needs Assessment* should inform the evaluator the strategies and assets people employ to achieve the livelihood objectives they desire (particularly the objectives the ICT4D aims to address/facilitate). With that information the evaluator should then more effectively identify ways in which information and knowledge has facilitated those strategies or enhanced those assets. Furthermore, through

the assessment of livelihoods the evaluator may identify new needs that may have emerged as a result of interacting with the ICT4D initiative. Such results can be used to further add value to the needs assessment of the community.

- *Programme Theory Assessment*

  The assessment of the Livelihoods theme will shed some light on whether the project's programme theory design is suitable for achieving livelihood goals. The programme theory design provides a benchmark on which the livelihood outcomes and impacts can be compared.

- *Process Assessment*

  The assessment of the Livelihoods theme will aid in identifying how people respond to new opportunities and what motivates their behaviour in terms of their livelihoods. Such information can be used as feedback for understanding the project processes and how well the project is operating.

7.4.4.4. Sub-themes for Livelihoods

The following sub-themes are based on the outputs of various livelihood strategies. However, it should not be assumed that people solely seek to effect change in these areas in their lives. Instead a deep understanding and recognition of the potential community livelihood goals should be sought after.

7.4.4.4.1. Wellbeing

People value an improvement in their well-being along with an increase of income. A number of factors affect people's well-being including: self-esteem, sense of control and inclusion, physical security, health, education, access to and assistance from public services, and the preservation of culture. Wellbeing encompasses social wellbeing (relationships and social connections), financial wellbeing (financial security), physical and psychological wellbeing (health), community wellbeing (community cohesiveness), and career wellbeing (daily activities) (DFID, 1999). From an ICT4D perspective wellbeing would entail how ICTs have affected the quality of life of an individual or a group and the positive/negative experiences they may have had as a result of the ICT4D programme. Therefore, eliciting data on wellbeing will inform project evaluators whether the ICT4D initiative is contributing towards people achieving their livelihood goals (DFID, 1999).

Assessing Wellbeing

Assessing wellbeing would entail determining which aspects of wellbeing are being addressed by the ICT4D initiative and then determine how information and knowledge has influenced these aspects of wellbeing. Data on whether the ICT4D initiative has altered the following aspects should be taken into account:

- social relationships,
- people's community involvement and connections within a community,
- people's sources of income,
- people's physical and psychological (attitude and motivation) health,
- community cohesiveness, and
- daily activities of community members.

Furthermore, data on what livelihood strategies people employ and how ICTs affect those strategies will inform the evaluator how ICTs facilitate the attainment of livelihood goals. In other words how does the use of ICTs link to livelihood strategies and the resources available to people? For example, what strategies does one employ to prevent health risks and how has information and knowledge from the ICT4D initiative contributed towards fulfilling those strategies?

Proposed Assessment Instruments

Assessing the *wellbeing* would require employing various instruments such as; documentation of preceding evaluations, questionnaires, and focus group discussions with project recipients (DFID, 1999; Wieman et al., 2001).

7.4.4.4.2. Vulnerability

The poor are often faced with challenges due to external factors such as shocks, trends and seasonality, which affect their assets and livelihoods. Negative shocks, trends and seasonality, such as, climate change and economic downturns in the market often force people to live in adverse conditions. In such cases, unsustainable livelihoods are common. Therefore, reducing vulnerability and risk such as improved food security and increasing the overall social sustainability of people's livelihood is important (DFID, 1999; Wieman et al., 2001). ICT4D initiatives should then determine how ICTs aid in coping with vulnerability?

Assessing Vulnerability

Assessing vulnerability would entail understanding the trends, seasonality and shocks that are of importance to the community. Effort can then be directed towards understanding how information and knowledge has aided (if at all) to minimise the negative vulnerability aspects.

Proposed Assessment Instruments

Livelihood surveys and focus groups are suitable means for assessing the vulnerability context (DFID, 1999; Wieman et al., 2001).

Proposed Assessment Instruments for Livelihoods

Possible instruments for assessing Livelihood are outlined in Table 7.4

Table 7.4: Possible instruments for assessing Livelihood

Theme	Instrument	Description
Wellbeing (DFID, 1999; Batchelor and Norrish, 2006; Myers, 2005)	***Questionnaire surveys***	Livelihood surveys may consist of information on the assets and strategies employed by communities to make a means of living. Community members are then able to identify areas where the ICT4D programme has contributed towards the activities and choices they employ to achieve their livelihood goals. Furthermore, Knowledge, Attitude, Behaviour, Practice (KABP) surveys can aid in understanding whether access to information and knowledge influenced people's behaviour and actions in favour of their livelihoods based on the livelihood goals the project is targeting
	Focus groups	Focus group discussions will aid in eliciting data on whether ICTs have aided in maximising peoples income and protected or enhanced things that people value, such as health, literacy, technical skills, agricultural skills, education, and entrepreneurial skills.
	Documentation	Documentation of the *Baseline Study* and *Needs Assessment* would provide background data on the way of life within the community prior to project implementation. The process assessment would then provide meaningful data on ICT usage and the application of ICTs to one's particular context (way of living). Such data may add value to understanding why particular livelihood outcomes and impacts have taken place or not.
Vulnerability (Duncombe, 2006;	***Focus groups***	Focus group discussions would look at vulnerability aspects the ICT4D initiatives aimed to mitigate and how information and knowledge through the ICT4D initiative has influenced these aspects. For example, how do income earning opportunities change throughout the year? Has the ICT4D

Mchombu, 1995)		initiative provided a platform to gauge the importance of different income-generating activities, determine the way market fluctuations affect livelihoods and relaying such information to people to act upon it
	Documentation	Livelihood information from *baseline study* data and *needs assessment* data may reveal trends, seasonality and shocks that the ICT4D initiative wishes to address and those that most affect the community. Such data may help reveal whether information and knowledge played a role in mitigating vulnerability risks.

7.4.4.5. Relationship with other themes

- *Empowerment*: People make use of assets and strategies to cope with vulnerability and pursue livelihood goals they desire. Improved livelihoods would empower them to continue pursuing livelihood strategies that will continue to forge a positive lifestyle.

7.4.5. Sustainability

7.4.5.1. Purpose

Sustainability aims to determine the means and ways in which an ICT4D initiative has contributed towards sustainable development. There has been a high failure rate of ICT4D programmes and as a result the importance of sustainable ICT4D projects has been emphasised (Balancing Act, 2013; Unwin, 2009: 365). It is useful to know and understand the extent to which ICT outcomes and impacts enhance sustainability and the extent to which they raise further sustainability issues that may encourage unsustainable trends (Souter, 2012: 4).

Sustainable development has often been defined as the ability to meet current needs without compromising the ability to meet future needs (World Commission, 1987). Therefore, using ICTs for sustainable solutions and mitigating the negative impacts is important for development (Hilty and Hercheui, 2010: 228; World Bank Group, 2012: 41). Sustainable development has often been discussed in view of its three dimensional pillars, namely the social, economic and environmental pillars. The effects of ICTs should then be analysed based on their effects on all three pillars of sustainable development (Souter, 2012: 4). Two further pillars may be added, that is the preservation of cultural diversity and intercultural interactions, and the governance that embraces decision making and behaviour by community stakeholders (Souter, 2012). However, it should be noted that the pillars for sustainable development are not at the same conceptual level. One level of sustainability cannot be substituted for another (Hilty and Hercheui, 2010: 229; Souter, 2012: 3). In the past there have been cases whereby

sustainability pillars have been treated in silos at the expense of other pillars. For example, economic growth has often been pursued at the expense of environmental sustainability, such as, unsustainable farming techniques. Therefore, it is important to address sustainability in a manner that recognises the interdependence of all pillars and the interactions between them (DFID, 1999; Souter, 2012: 3).

Sustainability is widely recognised; however, there are some views that it is not achievable and as a result some development policies prioritise short-term growth rather than sustainable growth (Hilty and Hercheui, 2010: 229; Souter, 2012: 2). A challenge of sustainability comes in when trying to find a balance between maintaining and supporting something in such a manner that it does not fail in the midst of a constantly changing rural environment. Furthermore, there is also the challenge of putting sustainability into practice (Ali and Bailur, 2007: 3; Batchelor and Norrish, 2006: 16). As a result it is suggested that a shift in focus from creating sustainable artefacts to sustainability of a concept is required, as change will always occur and unintended consequences may result. Emphasis should then not be placed on the actual ICT4D initiative being sustainable but instead should focus on the sustainability of the outputs, outcomes and impacts of the project or programme it supports (Batchelor and Norrish, 2006: 16). Evaluators should then assess whether there are mechanisms in place that will support and ensure that positive outputs, outcomes and impacts are sustainable and not short lived (Batchelor and Norrish, 2006: 16; Souter, 2012: 4).

7.4.5.2. Assessing outcomes related to sustainability

Based on the general outcome themes the evaluator should take in consideration the following key outcomes (Gigler, 2004; Grunfeld, 2007; Rossi et al., 1998):

- *Skills*: whether people have been equipped with the relevant ICT and information literacy skills, and whether there are measures in place to ensure such skills continue to be acquired by the community
- *Knowledge* and *Awareness*: whether project stakeholders are aware of sustainability concerns pertaining to the continued functioning of the ICT4D programmes
- *Attitude* and *Behaviour*: whether there are measures in place for continued positive change in attitude and behaviour in favour of community goals the ICT4D programme aims to address
- *Motivation*: whether stakeholders are motivated by project outcomes and impacts and continue to find ways to keep the project running.

7.4.5.3. Dependence on preceding domains of evaluation

The sustainability of the project outputs, outcomes and impacts depend on all preceding domains of evaluation.

- *Baseline Study* and *Needs Assessment*

  It is important that the assessment of the sustainability theme takes into account the initial status of the community and the evolving community needs in order to determine whether such needs are continued to be addressed. Furthermore, continued functioning of the ICT4D programme may identify new needs.
- *Programme Theory Assessment*

  The programme theory assessment may have further information as to whether the programme has been designed to run over a long period of time and how the design relates to the current project performance for sustaining outcomes and impacts.
- *Process Assessment*

  The process assessment may identify the conditions and processes that may have led to the achievement of sustainable outcomes and impacts. Such information will be useful for learning and for expanding the programme into new rural development avenues by ensuring that sustainability of project effects is achieved.
- *Scalability assessment*

  The assessment of *sustainability* provides useful feedback as to whether the project should be taken to scale as only sustainable outcomes and impacts should be expanded on or replicated in another area.

7.4.5.4. Assessing sustainability

To effectively assess sustainability, it is important to identify the outcomes and impacts of the ICT4D initiative, prior to conducting the assessment. Sustainability assesses the extent to which the positive outcomes and impacts are sustainable and maintained over time. It is important to determine whether the positive effects from *strategic value, most significant change, empowerment and livelihoods* are maintained in such a way that they can be replicated and scaled into new avenues that are working towards rural development (IDRC, 2005). For assessment purposes key issues to identify include (DFID, 1999; Batchelor and Norrish, 2002):

- whether outcomes and impacts have an effect on the environment (DFID, 1999)
- whether outcomes and impacts have contributed towards maximising social equity, shared ownership of project resources and values, social relationships and minimising social

exclusion (Ali and Bailur, 2007: 3; Batchelor and Norrish, 2002; Souter, 2012: 12; World Bank Group, 2012: 41)

- whether outcomes and impacts achieved have an effect on existing processes and structures and their capacity to function over a long period of time (DFID 199)
- whether the outcomes and impacts contribute towards the ICT4D initiative being able to meet the financial and social costs of maintaining and running the programme and continue to be in operation (Ali and Bailur, 2007: 3; Souter, 2012: 12).

Proposed Assessment Instruments

Questionnaires and interviews are useful in capturing information with regards to outcomes and impacts being sustainable. Possible instruments for assessing Sustainability are outlined in Table 7.5

Table 7.5: Possible Instruments for Assessing Sustainability

Instrument	Description
Questionnaires (Batchelor and Norrish, 2006; DFID, 1999; Figueroa, Kincaid, Rani and Lewis, 2002; Gigler, 2006)	Questionnaires are suitable for capturing general information on whether there is interest to keep the programme running and whether the outcomes and impacts will continue to be expected in the future.
Focus groups and Interviews (Batchelor and Norrish, 2006; DFID, 1999; Figueroa, Kincaid, Rani and Lewis, 2002; Mchombu, 1995)	Focus groups may reveal details on programme ownership and whether there is a transfer of ownership of programme activities to the target community. Through interviews project stakeholders (namely the project team) may reveal information on whether the outcomes and impacts lead to sustainable demand for services provided by the ICT4D initiative. Furthermore, the interviews may reveal information pertaining to what project stakeholders (namely project team), in general, consider as sustainable and the measures they have put in place for ensuring sustainability.

7.4.5.5. Relationship with other themes

Sustainability is interrelated with all themes for the outcome and impact assessment framework, as sustainability provides insight as to whether the positive effects of *strategic value, most significant change, empowerment* and *livelihoods* are long lived and do not result in unsustainable results. *Sustainability* determines whether the outcomes and impacts for all other themes are able to cope with the constantly changing rural environment and project

context, and do not undermine other community goals and objectives. Therefore, it takes each outcome and impact identified and determines whether it is sustainable.

7.5. RELATIONSHIP OF THEMES

The themes proposed for the outcome and impact assessment of rural ICT4D programmes are interdependent and interrelated and furthermore cannot be viewed as independent silos. They reinforce and build on each other to bring about change within communities. The objectives of human development are to enable people to succeed, expand their capabilities and empower them to engage in their development process. These characteristics are common across the outcome and impact assessment themes identified as they all work towards facilitating human development by means of ICTs. Successful human development results in people who live a life they find valuable; which is a core goal of empowerment and forms part of the proposed themes for outcome and impact assessment of ICT4D (Alkire, 2010: 39; Hamel, 2010: 2).

The proposed themes interact in multiple ways in an iterative manner. Through a process of "strategic value" ICT4D should position communities and rural activities in such a manner that enables individuals and community members to better achieve their development goals. The project should align its outputs in such a manner that positive outcomes and impacts result; outcomes and impacts that the community deem appropriate for their development. Furthermore "strategic value" paves the way forward for "most significant change", "empowerment", "livelihoods", and "sustainability" to take effect. Once a community is adequately positioned by means of ICTs, positive *change* can be experienced as a means of achieving end goals. Through "empowerment" people's capabilities are enhanced in order to make better life choices and achieve positive "livelihood" effects and positive "most significant change" given the external environment and context in which people live. Livelihoods are a result of the choices people make given the assets they possess, the vulnerabilities they face and the strategies they employ to convert assets into outcomes of value. Therefore by empowering communities, people are given the opportunity to enhance their social, informational and human capabilities to make enhanced choices pertaining to their "livelihoods". As much as ICT4D programmes can bring about positive change, empower people, and positively impact people's livelihood they are not deemed a success unless such outcomes and impacts are *sustainable* (Unwin, 2009: 365). "Sustainability" would consider how to sustain the positive outcomes and impacts observed through peoples "livelihoods" and through the individual and community *changes* that have occurred. These processes further

facilitate the expansion of ICT4D initiatives and add new "strategic value". In the long run all themes work towards empowering people and therefore human development.

7.6. SUMMARY OF DEPENDENCE OF CRITICAL THEMES ON PRECEDING DOMAINS OF EVALUATION

Each of the critical themes identified would best be understood with reference to preceding domains of evaluation according to the Rural ICT-Comprehensive Evaluation Framework. The following domains of evaluation should be considered (Rossi et al., 2004; Pade-Khene and Sewry, 2011).

- *Baseline Study* (Batchelor and Norrish, 2006; DeLone and McLean, 2003; DFID, 1999; Figueroa, Kincaid, Rani and Lewis, 2002; Gigler, 2004; Hallikainen and Chen, 2005; Mchombu, 1995; Myers, 2005)

  The baseline assessment should inform the evaluator of the strategies and assets people employ to achieve the livelihood objectives they desire. It provides a means to benchmark the changes that have taken place and determine whether a community is being adequately positioned to achieve their goals. It further informs the evaluator how agency and opportunity structure has changed overtime based on the initial status of the community.
- *Needs Assessment* (Gigler, 2004; DFID, 1999; Figueroa, Kincaid, Rani and Lewis, 2002; Mchombu, 1995)

  The Needs Assessment helps clarify the project aims and any emerging (demand driven) community needs that are being addressed. These needs can be matched to the observed outputs to determine whether outputs are suitable for achieving the project aims. Through the assessment of *most significant change*, *empowerment* and *livelihoods*, the evaluator may identify new needs that may have emerged as a result of interacting with the ICT4D initiative.
- *Programme Theory Assessment* (DeLone and McLean, 2003)

  Information from assessing Strategic Value can enhance the Programme Theory Assessment, as it confirms whether the project design is suitable to best achieve community goals. Assessment of critical themes would uncover whether the conception of the project is suitable depending on whether the changes experienced are positive and in-line with what the community desires. This further provides an indication whether the ICT project's design is sound to achieve various levels of empowerment (expected and

unexpected) and livelihood goals. It aids in understanding whether the project was adequately designed to achieve agency and positively influence the opportunity structure.

- *Process Assessment* (Batchelor and Norrish, 2006; DeLone and McLean, 2003; DFID, 1999; Figueroa, Kincaid, Rani and Lewis, 2002; Gigler, 2004; Hallikainen and Chen, 2005; Mchombu, 1995)

  Process Assessment provides useful data on why particular outputs have been targeted in order for the project to fulfil its intended role to address community needs. The process assessment would provide details as to the conditions and processes that have taken place and therefore, resulted in the changes (outcomes and impact) that have been experienced by the community. Such information will be useful for learning and for expanding the programme into new rural development avenues. Reflecting on the process assessment will also aid in understanding how people respond to new opportunities and what motivates their behaviour in terms of their livelihoods. Such information can be used as feedback for understanding the project processes and how well the project is operating.

7.7. LIMITATIONS

Various ICTs have different effects in different contexts making measuring outcomes and impacts inconsistent. ICT outcomes and impacts can range from direct to indirect, intended to unintended, positive to negative, economic, social or environmental. This diversity of impacts adds complexity of categorising ICT effects into independent silos. Many ICTs facilitate change and therefore have indirect impacts which are not directly measurable. The themes identified also incorporate social and intangible effects which make it difficult to determine causality and measure in an objective and straightforward manner (UNCTAD, 2011: 9). The proposed framework forms a foundation on which any ICT4D outcome and impact assessment should be created. However, the framework has to be applied in various rural ICT4D projects before it can be generalisable to any kind of ICT4D initiative (UNCTAD, 2011).

7.8. CONCLUSION

Rural ICT4D programmes require an in-depth understanding of the effects that ICTs have on rural development and their level of success. A theoretical framework for the outcome and impact assessment of ICT4D has been developed. The proposed framework is structured around the evaluation guidelines, the key themes of rural ICT4D outcome and impact assessment and the preceding domains of evaluation. These components facilitate the application of the critical themes identified for the outcome and impact assessment of rural

ICT4D. The critical themes for such an assessment include "Strategic Value", "Empowerment", "Livelihoods", "Most Significant Change" and "Sustainability". The identified themes are interdependent and should be viewed as elements that reinforce one another. All themes work together to bring about change that meets the evolving needs of community members. These themes provide the basic expected effects of any rural ICT4D programme and should be used as a starting point when evaluating the outcome and impact of rural ICT4D programmes. To demonstrate the suitability and shortcomings of the proposed framework a real life case application of the framework is required. Such an application would reveal lessons learned for framework enhancement.

Chapter 8: Research Methodology

8.1. INTRODUCTION

8.2. RESEARCH PARADIGM

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8.1. INTRODUCTION

A comprehensive framework for assessing ICT4D effects is deemed appropriate at a time when many ICT4D programmes fail to comprehensively demonstrate their impact or their contribution towards rural development. A framework for the outcome and impact assessment of rural ICT4D is proposed to meet the need to comprehensively evaluate ICT4D programmes. As part of the framework development process it is important to identify its relevance and suitability in a real life ICT4D environment.

The following chapter describes the research methodology employed to develop and explore the proposed Outcome and Impact assessment framework. A case study strategy is selected as a means to study the proposed framework within an ICT4D environment. The case study design, which outlines the case study research questions, unit of analysis, research instruments, and the data analysis techniques adopted is then discussed. The case study design guides the implementation and evaluation of the Outcome and Impact assessment framework in the SLL and the ICT4RED projects in South Africa. Lastly, the validation of data and the ethical considerations of the research are outlined.

8.2. RESEARCH APPROACH

A qualitative Design Science research approach is employed to conduct the research, as discussed in Chapter 2. Design Science is considered a suitable approach as the Outcome and Impact Assessment framework (the artefact) is created and its use and performance is then evaluated. This will be achieved through the *actual* assessment of a rural ICT4D case using the Outcome and Impact Assessment framework developed (Hevner, March and Park, 2004; Islam and Grönlund, 2012). The observations and reflections (Chapter 9) of the application of the Outcome and Impact assessment framework would reveal the suitability and shortcomings of the proposed framework with the aim of revising the framework.

8.3. RESEARCH STRATEGY

A Case Study research strategy is adopted as a means to implement, demonstrate, and evaluate the proposed Outcome and Impact assessment framework. Table 8.1 (adapted from Creswell, 2003) provides a brief comparison of different strategies, whereby the case study strategy is the most suitable as depicted by the ticks applied. The ticks indicate the characteristics that are suitable for achieving the research objectives within the Design Science approach followed. From the number of ticks displayed, the case study strategy is the most suitable for this research study.

Table 8. 1: Selection of possible research strategy

Strategy	Characteristics	Research Questions
Ethnography	Study of intact group in its natural context for a sustained time	
	Researcher is an observer/participant observer	✓
	Emphasis is placed on culture and behaviour	
	Labour and time intensive	
	Extensive fieldwork required in natural setting	
	Multiple methods for data collection – observations, ethnographic interviews	
	Holistic rich description of participants' perceptions and experience	
Grounded theory	Building naturalistic theory	
	Iterative data collection and analysis refining theory	
	Theory is expected outcome of enquiry	
	Primarily inductive	
Case study	Focus on how and why questions	✓
	Focus on depth	✓
	Richly describe and explain/assess and evaluate phenomenon	✓
	Contemporary phenomenon being studied in real life context	✓
	Multiple sources of evidence	✓
	Study theoretical propositions	✓
	Data gathering is interactive	✓
Historical research	Relies on inductive, logical reasoning	
	Relies on records, oral history and photographs	
	Explains past events and philosophies	
	Cross-referencing is essential	
Action research	Inquire into participants' perception of reality	
	Emphasis on change	

Strategy	Characteristics	Research Questions
	Empower participants	
	More deductive	
	Provide solutions to participants	
	Modify a given reality/develop new system	
	Researcher intervenes in problem setting	✓
	Exploratory and descriptive	✓

The Design Science approach requires that the proposed framework (artefact) be 'implementable' and consequently applied to the appropriate environment (Hevner, 2004). Therefore, to identify the relevance and suitability of the proposed framework it is important that it is applied in a real life case study.

Case studies are constructed to richly describe, explain or assess an event or a programme. They allow the researcher to conduct an in-depth investigation in order to understand and explore complex issues (Creswell, 2003; Welman and Kruger, 2001). Case studies are known for answering "why" and "how" questions; therefore the rich in-depth data provides new ideas that are used to revise the Outcome and Impact assessment framework. Furthermore, the case study strategy allows the researcher to gain a holistic understanding of the proposed key themes in a real life context.

The case study investigation seeks to reveal the shortcomings and suitability of the key themes, and domains of evaluation, the suitability of methods and assessment instruments employed, and reveal how the proposed framework works within a rural environment (Hevner and Chatterjee, 2010). It aids in understanding how and why the proposed framework under investigation is suitable, relevant or not (Andrade, 2009). Furthermore, the case study provides a platform to implement all other components of the proposed framework which include the 'Evaluation Guidelines' and the 'Preceding Domains of Evaluation'; namely the *Baseline Assessment*, the *Needs Assessment, Programme Theory Assessment*, and *Process Assessment* as outlined in the rural ICT comprehensive evaluation framework (RICT-CEF) proposed by Khene and Sewry (2010). Through observing how well the proposed framework supports the outcome and impact assessment of a rural ICT project, the evaluator is provided with data on how the different framework components interact and produce results.

Case studies are often questioned on the issue of generalisation from single cases. However, generalisation from a single case study is based on deductive reasoning and analytic

generalisation (Johansson, 2003; Yin, 2009). Deductive reasoning makes use of a conceptual framework, which is applied and consequences are then derived by deduction. By comparing the expected findings from theory (proposed Outcome and Impact assessment framework) and a case (application of proposed framework) with observed (empirical) findings it is possible to assess the theory. As a result, from the theory and the findings of the case application, generalisations can be drawn concerning the theory domain. The domain in which the theory works can then be defined more effectively. In other words, single cases contribute to knowledge as they generalise to theoretical propositions with the aim of expanding theories (analytical generalisation) (Johansson, 2003: 9; Yin, 2009: 15). The Siyakhula Living Lab (SLL) project and the ICT4RED project serve as case studies, whereby the Outcome and Impact assessment framework are implemented and evaluated.

The Siyakhula Living Lab (SLL) is situated in the rural Transkei of South Africa, and has introduced computers and computer literacy training to community members of the Mbashe municipality. The Mbashe municipality is a rural area along the wild coast of the Eastern Cape province of South Africa. It aims to develop a distributed, multifunctional community platform, to deploy in marginalised and semi-marginalised communities in South Africa. Since its inception in 2005, the SLL is expected to have had an impact on the Mbashe municipality and consequently, requires evaluation to assess its impact.

The Information and Communication Technologies for Rural Education Development (ICT4RED) is a project initiated by the South African government to supply electronic textbooks to rural schools in the Cofimvaba district in the Eastern Cape Province of South Africa. The project was piloted at Arthur Mfebe Senior Secondary School in 2013, which forms the core research site for this study. The project expanded to explore the use of tablets to improve 21st-century teaching and learning skills in the area and subsequently improve education in the district. The ICT4RED project was in the process of being handed over to the recipient community in 2015. Moreover, the project expanded to 25 schools in the area and has plans to expand to all the schools in the Cofimvaba District. With the plans to expand to all schools in the district and the handover to the Department of Education, an outcome and impact assessment is deemed appropriate to determine if the project has positive outcomes and impacts suitable for expansion, and replication.

Motivation for Selected Case Studies

The SLL is suitable as previous aspects of its project lifecycle have been evaluated. A Baseline Study, the Needs Assessment, the Programme Theory Assessment, and Process Assessment have been conducted in the SLL. These preceding evaluations all inform the Outcome and Impact assessment framework and provide a comprehensive understanding to capture the relevant impact and effectiveness of the SLL. The ICT4RED project is a suitable case study as it provides an alternative ICT4D project in, which an impact assessment was required. Although, previous aspects of its project life cycle were not distinctly evaluated and categorised as the domains from the RICT-CEF, it does provide a platform to determine how the framework works in an environment that does not embrace a comprehensive approach to evaluation. The lessons learned from applying the proposed framework to evaluate the SLL and ICT4RED project are used to inform and revise the Outcome and Impact assessment framework.

Two levels of enquiry are applied in the case study investigation:

Level 1: Firstly the proposed framework is implemented in the SLL and the IC4RED project. The aim is to assess the outcome and the impact as an evaluation exercise of the two cases. The methods employed are dependent on the proposed outcome and impact *theme* being assessed. The proposed framework outlines the design of the first level of enquiry of the case study process. A detailed description of the methods applied within the evaluation process is provided in the case study evaluation reports, see Appendix E & G.

Level 2: The second level involves a reflective process observing how the proposed framework is applied. The aim is to determine the suitability and shortcomings of the framework within the SLL and ICT4RED project based on Design Science (Hevner et al., 2004: 75). The application of the proposed framework and the assessment of its utility initiate the reflective process of the proposed framework and aid in the subsequent revisions of the framework. Revisions to the framework incorporate the lessons learned from the framework application and reflective exercise. The continued incremental and iterative improvement of the framework improves the ability to transfer and contextualise the framework to different environments. The reflective exercise entails:

- How the suggested evaluation guidelines and suggested assessment methods are employed to evaluate each critical theme.

- The suitability of assessing the outcome and impact of an ICT4D intervention using the Outcome and Impact assessment framework.

It should be noted that the core function of this research is the application of the proposed framework to evaluate the proposed framework (level 2).

8.4. CASE STUDY DESIGN

The case study design that follows relates to the second level of enquiry of the case study process. The case study design aims to link the empirical findings and conclusions made, to the research questions proposed by the study (Yin, 2009). The research design comprises of the following components that guide the Outcome and Impact assessment framework investigation:

8.4.1. Case Study Research Question

The case study aims to explore and evaluate the utility and performance of the Outcome and Impact assessment framework in assessing the SLL and the ICT4RED project. The following case study research questions guide the case study investigation:

a) How is the proposed framework applied to assess the outcome and impact of the SLL and the ICT4RED projects as part of on-going evaluation?
b) What are the key lessons from applying the proposed framework in the SLL and ICT4RED projects?

8.4.2. Unit of Analysis

The unit of analysis represents the second level of enquiry for the case study. The unit of analysis is the actual *application* of the Outcome and Impact assessment framework to assess the outcomes and impacts of the SLL and the ICT4RED project.

8.4.3. Research Instruments

It is important to understand the Outcome and Impact themes and their application from the observations and reflections of the researcher and evaluation participants. Therefore, *participant observations*, *semi-structured interviews*, and *documentation* are the tools employed to collect data. However, the primary data source is the researcher's observations made during the application of the Outcome and Impact assessment framework while conducting the actual outcome and impact assessment of the selected case studies. The

instruments that are used to evaluate the application of the framework include interviews, participant observations and document analysis:

Interviews

Semi-structured interviews provide useful means of collecting data. They allow the interviewer to gain further clarification and explanation to responses made. The interviews are conducted either in a focus group environment or as one-on-one interviews with project stakeholders at the end of the actual Outcome and Impact assessment application. The semi-structured interviews aid in gaining a holistic view from project stakeholders on how the outcome and impact assessment can be improved. Moreover, semi-structured interviews are useful in explorative research (Welman and Kruger, 2001). The interview questions are directed towards the participants' experiences, towards the evaluation process, and the themes that are applied during the outcome and impact assessment of the SLL and the ICTRED. Participants are asked questions around the relevance of outcome and impact themes, the value the themes add, and the general evaluation experience. Furthermore, participants are given the opportunity to suggest improvements for the framework application and its components.

An interview guide is employed. It outlines a list of topics that influence the themes being assessed which the interviewer raises during the interview process (Welman and Kruger, 2001: 161). The structures of the topics evolve depending on the way the interview develops. The project management team, rural project champions, teachers, community members (specific to the SLL), and district officials (specific to the ICT4RED project), and subject advisors (specific to the ICT4RED project) are interviewed to explore the implementation of the proposed framework. All participants are asked similar questions pertaining to the application of the framework. However, each group will have additional questions pertaining to the group. The following is noted:

- The project management and project champions: questions are directed toward the functioning of the project and how it is managed. These groups are most useful for assessing the *Strategic Value* and *Sustainability* of the programme and therefore, determine whether these factors are important in an assessment. The project team and the project champions are usually the most informed on the functioning of the project and the project plans.
- Teachers: questions are directed towards their experiences with learners (ICT4RED) and users of the labs (SLL). Teachers have direct contact with students (SLL and

ICT4RED) and community members (SLL) who have been involved in the projects. They have been exposed to what end users of ICTs expect and value.

- Community members (SLL): questions are directed towards their needs as indicated within prior project documentation.

One-on-one interviews are suitable in cases where individual stakeholders are unable to express their views within a group setting. Interviews are likely to be 20 minutes in length. To guide the semi-structured interview process several factors are taken into account (Welman and Kruger, 2001):

- In order for respondents to create their own responses, the questions posed are open-ended, allowing the respondent to freely express themselves.
- Questions should not offend respondents and should be brief to avoid ambiguity.
- Questions should be neutral and should avoid suggesting specific responses from interviewees, for example, questions that suggest an acceptable response such as "do you always feel negative?"
- The order in which questions are posed should not intimidate the respondents. The interview should begin with easy questions that are related to the case in question. More in-depth questions should then follow towards the end. Furthermore, similar questions should be grouped together to avoid the respondent switching focus throughout the interview.

All respondents are informed of the interview in order to elicit their consent. Consent from respondents is requested in the form of a letter that details the purpose of the interview, the interview questions, the general interview process, and the value of the potential participants' views and perspectives. Lastly, for the interview process the researcher should be prepared with the appropriate equipment that best captures and elicits information provided by research participants. An audio recording device is useful as it aids in recalling the interview process. Furthermore, stationary such as writing pads, pens, and pencils are useful for note taking during the interview process.

Participant Observations

Participant observations require the researcher to participate within the research environment, and observe and reflect on how the outcome and impact assessment is conducted (Creswell, 2007; Yin, 2009). It offers the researcher the opportunity to experience what the project participants' experience, and understand their perspective of the proposed framework application. The researcher approaches the observations with minimum preconceived ideas and has the flexibility to follow up on any interesting observations made (Welman and Kruger, 2001). Through participant observation, a report on the experiences of the community members and the researcher involved in the assessment is taken (refer to Chapter 9) (Welman and Kruger, 2001). This aids in understanding the assessment activities of the framework and its revision. This approach focuses on observing the assessment of all themes as the evaluator takes part in the evaluation process. Furthermore, the evaluator observes her decisions and approaches used (how and why) to apply the proposed framework in both case studies. The experiences and knowledge gained through this process provide valuable insight into the case study through lessons learned (Chapter 9).

To ensure that the observation process is fruitful and elicits data of value, a number of factors are considered. Furthermore, the use of stationary tools such as note pads, writing utensils and an audio recorder facilitate the process of taking notes on the evaluation process and make an accurate account of the process that takes place. The factors considered to guide the evaluation include (Kawulich, 2005; Creswell, 2003):

- **What to observe and the data collection objectives:** The subject of observation is the application of the Outcome and Impact assessment framework. The framework application includes observing the evaluation guidelines that are employed, and the methods and procedures followed when assessing each proposed theme. In addition, the responses and reactions of evaluation participants and the evaluator herself are observed and recorded. These activities aid in determining how the evaluation process was conducted and why it was conducted in that manner.
- **Role of observer:** The observer primarily plays a participatory role, as they take part in project activities within the SLL and the ICT4RED project and conduct the evaluation process. The role played by the observer does influence the type of data collected. Therefore, engaging at a participatory level develops a holistic understanding of the subject under study.
- **Procedure for recording observation notes:** Evaluation notes are taken throughout the assessment process. The various activities engaged in throughout the evaluation process

are recorded, which include the observations made, project stakeholder experiences, and the responses from evaluation participants. The notes made also include a descriptive and reflective account of the proposed framework application. The evaluator reflects on the activities they engaged in with the aim of describing why key themes are relevant or not and why particular methods were employed. Moreover, informal interviews with participants clarify the perspectives and reactions of individuals throughout the evaluation.

Document analysis

As this research is part of ongoing evaluation research, documentation of preceding evaluations in the ICT4RED project and the SLL projects, such as the Baseline Study, Needs Assessment, Programme Theory Assessment, and the Process Assessment are consulted. Reviews of preceding evaluations reveal information on the operation of the projects and their contexts. More importantly, preceding assessment domains inform the key themes from the proposed framework. Such a review adds to the comprehensive nature of the evaluation and adds value to the framework. The lessons learned from preceding evaluation domains inform the reflective process and further inform the evaluator on what to expect and possibly apply within the field.

8.5. OVERALL DATA COLLECTION

Data is collected through primary and secondary means. The primary data is collected through the case study reflective exercises, while the secondary data is gathered from a review of existing literature. Therefore, the data collection process involves two stages:

Stage 1: *Review of existing outcome and impact assessment literature*

From the literature review (Chapters 3-5) an analysis of existing impact assessment frameworks occurs in Chapter 6. The aim of the analysis is to identify the basic themes that should be assessed in any ICT4D impact assessment framework. These themes form part of the comprehensive approach that contributes to the development of the Outcome and Impact assessment framework. The analysis contributes to the proposed theoretical framework on the Outcome and Impact assessment of ICT4D which is presented in Chapter 7.

Stage 2: *Reflections from the application of the proposed framework in two real life ICT4D environments*

The second stage of data collection is the application of the proposed framework in a real life environment. As part of the Design Science approach being followed an artefact needs to be

demonstrated within an appropriate environment and evaluated. The proposed framework is used as a tool to conduct an outcome and impact assessment of the SLL and the ICT4RED project. Through this process, a reflection of the framework implementation takes place. Refer to Section 2.4.3 for details on the data collection instruments used for the reflective exercise.

8.6. DATA ANALYSIS

Thematic analysis and the Explanation Building technique are employed to analyse the key data collected for the overall development of the proposed Outcome and Impact assessment framework. The analysis of existing impact assessment frameworks employed the thematic analysis method as a means to determine key outcome and impact themes that contribute to an Outcome and Impact assessment framework. The application of the framework employed the explanation building technique.

8.6.1. Thematic Analysis

Thematic analysis is a qualitative analytical method used to analyse qualitative data. It is used to search and analyse for themes (important aspects of the data related to the research question) or patterns in data (Braun and Clarke, 2006). A six-phase approach as shown in Table 8.2 is followed to conduct the thematic analysis of empirical data as outlined by Braun and Clarke (2006). The analysis process involves a combination of open and closed thematic analysis. The researcher first analyses the data through open coding by discovering the themes as they emerge from the data itself. The emergent themes are then viewed through the lens of the key *Outcome* and *Impact* themes from Chapter 7 and categorised according to these themes through a closed coding process.

Table 8. 2: Six-phase approach for thematic analysis

Phase	Description according to current study
1. Familiarising yourself with your data	This stage involves reading and re-reading through the interview transcripts and narratives, and noting down initial ideas on outcomes and impacts emerging from the data itself.
2. Generating initial codes	This stage involves coding features in the data that are interesting across all the transcripts and narratives and grouping relevant data to each code
3. Searching for themes	This stage involves gathering the codes into potential themes and gathering all data related to each potential theme
4. Reviewing themes	Reviewing whether themes relate to coded data and also to the entire data set creating a map of the analysis
5. Defining and naming themes	This stage involves refining the details for each theme and the overall analysis story. As part of refining the specifics of each

	theme, the researcher categorises the findings according to the key *Outcome* and *Impact* themes identified from the critical analysis of existing literature (Chapter 6). During this process, the researcher identifies the proposed Outcome and Impact themes that are relevant to ICT4D outcome and impact assessment, based on the findings from the field.
6. Producing the report	This is the final stage of the analysis. Relating the analysis back to the key Outcome and Impact themes and key research question.

(adapted from Braun and Clarke, 2006)

8.6.2. Explanation Building

The general analytical strategy employed relies on the theoretical propositions proposed by the Outcome and Impact assessment framework. Therefore, the application of the proposed framework guides the analysis; following the data collection plan that has formed part of the case study design. The theoretical propositions that are made, help to focus attention on relevant data associated with the research questions (Yin, 2009). The explanation building technique is used as part of the general strategy employed. Explanation building aims to analyse a case study by building an explanation of the case and developing causal links (Yin, 2009). With explanation building a series of iterations will result. An initial theoretical proposition is made. The findings from an initial case are then compared against the proposition. The proposition will then be revised. Such a process is suitable for Design Science; whereby the design and evaluation of an artefact requires an iterative process to refine the artefact. Explanation building is a suitable approach as it aims to refine a set of ideas and consequently revise the proposed Outcome and Impact assessment framework. The following process will be repeated as often as required. The process that is applied is as follows (Yin, 2009):

a) The Initial Outcome and Impact assessment is reviewed.
b) The findings from the application of the Outcome and Impact assessment within the SLL and ICT4RED project are compared to the initial theoretical proposition (Outcome and Impact assessment).
c) The Outcome and Impact assessment is revised given the comparison results from (b).
d) Further details of the case are then compared to the revisions of the Outcome and Impact assessment.
e) The revisions made to the Outcome and Impact assessment can then be compared to other rural ICT project applications. (Future research)

The aim of the evaluation and revisions of the proposed framework is to improve ongoing ICT4D evaluation and gain feedback on whether the utilities of the proposed framework are in accordance with expectations (Islam and Grönlund, 2012).

8.7. DATA VALIDATION

In qualitative research, trustworthiness of findings is important. To ensure the trustworthiness of data the researcher employs *data triangulation, member checking* and *chain of evidence* during the data collection and data analysis process (Creswell, 2003).

- **Data triangulation** – The researcher uses multiple methods of data generation and multiple data sources. The researcher employed interviews, participant observations and documentation as alternative methods for evaluating the proposed framework. Moreover, multiple sources of data were employed in the data collection process for both the Outcome and Impact assessment framework construction and evaluation. For example, the initial construction of the proposed theoretical framework refers to literature from three different programmes – Social programmes, IS/IT programmes and ICT4D programmes. In both case studies, the researcher elicits data from prior project evaluation reports, and interviews multiple stakeholders to gain different perspectives on the use of the proposed framework. For example, from the SLL the researcher interviews teachers, project champions and community members. While, from the ICT4RED project the researcher gains data from District officials, learners, teachers, project champions and subject advisors. Moreover, the researcher follows up on interviews with several interviewees.
- **Member checking** – Member checking involves ensuring that findings and conclusions made from data are accurate. The researcher gains feedback on emergent findings from several interviewees through follow-up discussions over the phone, and informal interviews. For example, during observations in both case studies the researcher engaged in several follow-up casual conversations to confirm some of the findings of the study.
- **Chain of evidence** – It is important to ensure that a data chain of evidence is established in research. The researcher engages in both case studies over a period. Prolonged engagement is useful for identifying similar findings as part of the process of gaining in-depth insight on both cases. Moreover, the researcher produces thick descriptions of the findings (drawing on extracts from data) through the outcome and impact assessments reports (Appendix E & G) and the reflection of the assessment process (Chapter 9).

8.8. ETHICAL CONSIDERATIONS

As this research has the potential to impact the lives of people involved in the SLL and the ICT4RED project, a number of ethical concerns are considered. All communication and interaction will be conducted with honesty, integrity and trust. Issues such as informed consent, privacy, confidentiality and anonymity, harm and risk are also taken into account. Moreover, the following research is reviewed and approved by the ethical committee of the Information Systems department at Rhodes University prior to conducting the research. The research also gained the appropriate permissions from the District Manager (Department of Education) to conduct research at the schools in Dwesa for the SLL. Ethical consent to conduct research in the Cofimvaba school district was also sought through the ICT4RED project.

The following issues deserve mention (Creswell, 2003):

- **Informed consent:** The process of interviews and participant observations can only be carried out after the researcher has explained to community members the research purpose, the intended outcomes and consent has been obtained. All participants are informed about the purpose of the evaluation and are given the opportunity to engage with the evaluation process (Creswell, 200; Brydon, 2006; Krauss, 2009). A consent form is developed for research participants to sign before engaging in the evaluation process. The consent form outlines details of the research and that participants rights have been acknowledged. The consent form also details the participants' right to participate voluntarily, right to withdraw at any time, the right to ask questions and obtain a copy of results, the right to have their privacy respected, the benefits of the study, and the signatures of both researcher and participants (Creswell, 2003).
- **Confidentiality and anonymity:** In cases where sensitive issues are involved, informed consent is in the form of confidentiality and anonymity. Names and personal data of participants are kept anonymous as they share their thoughts, experiences, and attitudes with regards to the SLL/ICT4RED project and its impact (Creswell, 2003).
- **Building relationships:** Building relationships with potential participants is important. Through relationships, participants engage and provide their views and knowledge on ways to conduct the evaluation and improve the evaluation process. Furthermore, strong relationships reveal to the evaluator the various cultural, value dynamics within the community or among participants, and therefore, enable the evaluator to conduct a culturally appropriate evaluation. Relationships also foster communication between

various project stakeholders, which provides a platform to clarify roles of participants and clarify any expectations between participants and the evaluator (Creswell, 2003; Brunet et al., 2004; Brydon, 2006; Mthoko and Pade-Khene, 2013).

- **Harm and risk:** The researcher needs to respect the participants and the research site. Minimal disruption of the physical setting should be observed. Individuals should be involved in the evaluation design process prior to collecting data and actively seek means to reduce any risk or harm upon the research participants. For example, the evaluator should avoid disclosing possible harmful information, falsifying information and raising false hope in research participants (Creswell, 2003; Krauss, 2009).

8.9. CONCLUSION

This chapter discussed the research methodology. The philosophical approach (Design Science) embedding the research and the research strategy (Case Study) followed was presented. The case study strategy provides a holistic understanding of the proposed framework in a real life context. The application, exploration and evaluation of the proposed framework in the selected case studies expose the suitability, relevance, and shortcomings of the framework. This case study process comprises of two levels: Firstly, the Outcome and Impact assessment is applied within the SLL and the ICT4RED project. The second level involves a reflective process observing how the proposed framework is applied. The case study design guides the exploration of the proposed framework in a real life environment suitable for its effective evaluation. The data collection, analysis, and validation were further discussed. The chapter concluded with the ethical considerations employed to ensure this research study is conducted in a manner that is deemed appropriate by various entities. Table 8.3 outlines an overview summary of the research design guiding this research.

Table 8. 3: Summary of research design guiding this study

Research component	Research choice made
Research approach	Design Science
Research strategy	Case Study
Case study sites	SLL and ICT4RED project
Case study unit of analysis	Application of the Outcome and Impact assessment framework in real life context
Data collection techniques	• Literature review • Participant observations • Interviews • Documentation
Data analysis	• Thematic analysis • Explanation building
Data validation	• Triangulation • Member checking • Chain of evidence
Ethical considerations	• Informed consent • Confidentiality and anonymity • Building relationships • Reducing harm and risk

Chapter 9: Case study Exploration of the *Siyakhula Living Lab* and ICT4RED projects.

9.1. INTRODUCTION

9.1.1. Motivation for the selected Case studies

9.2. CASE STUDY 1: THE SIYAKHULA LIVING LAB

9.2.1. Background to Dwesa

9.2.2. SLL services to the Dwesa Community

9.2.3. SLL Impact Theory

9.2.4. Preceding Evaluations of the Siyakhula Living Lab

9.2.5. SLL Outcome and Impact assessment Evaluation Plan

9.3. REFLECTIONS ON THE OUTCOME AND IMPACT ASSESSMENT OF THE SIYAKHULA LIVING LAB

9.3.1. Application of Evaluation Guidelines

9.3.2. Application of Outcome and Impact Themes

9.3.3. Summary of data collection instruments

9.3.4. Summary of Lessons Learned from the Assessment of Outcomes and Impacts: SLL

9.4. CASE STUDY 2: ICT4RED

9.4.1. Background to Cofimvaba

9.4.2. ICT4RED Background

9.4.3. ICT4RED Teacher Professional Development

9.4.4. ICT4RED Outcome and Impact assessment Evaluation Plan

9.5. REFLECTIONS ON THE OUTCOME AND IMPACT ASSESSMENT OF THE ICT4RED

9.5.1 Application of Evaluation Guidelines

9.5.2 Application of Outcomes and Impact Themes

9.5.3 Summary of Lessons Learned from the Assessment of Outcomes and Impacts: ICT4RED

9.6. COMPARATIVE REFLECTION ON THE SLL AND ICT4RED

9.6.1. Application of Evaluation Guidelines

9.6.2. Application of Outcome and Impact Themes

9.7. CONCLUSION

9.1. INTRODUCTION

The Outcome and Impact Assessment of rural ICT projects should be informed by all evaluations that have taken place throughout a project lifecycle. The proposed Outcome and Impact Assessment framework highlights five key themes that should be assessed as part of a comprehensive approach to evaluation. These key themes include: Strategic Value, Most Significant Change, Empowerment, Livelihoods and Sustainability. To demonstrate the suitability and applicability of the Outcome and Impact Assessment framework, it has been applied in two real life rural ICT4D projects as case studies. The Siyakhula Living Lab (SLL) and the Information and Communication Technology for Rural Education Development (ICT4RED) projects have been selected as suitable case studies for the proposed framework implementation. The application of the framework in these real life cases aims to highlight the lessons learned for framework enhancement.

The following chapter describes the process the researcher went through to conduct the Outcome and Impact Assessment of the SLL and the ICT4RED project. It outlines the researchers' experiences in the field while assessing both projects. A brief background to the SLL is first outlined. The overall evaluation plan the researcher followed is then discussed. The chapter then details how the different components of the assessment framework were applied in the SLL and the lessons learned. Subsequently, a brief background of the ICT4RED project is described. This is followed by the ICT4RED project evaluation plan. The reflections from the application of all the components of the proposed framework are then presented. Consequently, the lessons learned from the ICT4RED project assessment are discussed. The final section of the chapter involves a comparative discussion of the researcher's experience in both case studies. The chapter concludes that the application of the proposed framework in a real life case study was a useful exercise to inform and revise the framework for its continued development and future assessments.

9.1.1. Motivation for the selected Case studies

a. Siyakhula Living Lab

The Siyakhula Living Lab is a suitable candidate for Outcome and Impact Assessment as it has been operating since 2005, giving the project sufficient time for some form of outcome and impact to have taken place. More importantly, the SLL forms part of continued research on the notion of a comprehensive approach to evaluation. All domains of evaluation prior to the Outcome and Impact assessment – the Baseline Study, the Needs Assessment, the Programme

Theory Assessment, and Process Assessment – have been conducted in the SLL, which subsequently requires an Outcome and Impact Assessment to be conducted in its context. As highlighted in Chapter 7, these prior evaluations together inform the Outcome and Impact Assessment of an ICT4D project. Therefore, these preceding domains of evaluation, which have been conducted in the SLL, provide a comprehensive understanding of the outcomes and impacts that are captured. Moreover, the SLL provides an opportunity to see the value of a comprehensive evaluation approach in action. In order to demonstrate the Outcome and Impact Assessment framework's suitability to assorted ICT4D projects, a second case study – the ICT4RED project – has been selected.

b. ICT4RED project

The ICT4RED project provides a slightly different ICT4D context and focus, in which the proposed Outcome and Impact Assessment was implemented. A comprehensive approach to evaluation has not been applied in the ICT4RED project, which yielded some challenges discussed as part of the ICT4RED project reflections in Section 9.4. The project however, does provide an opportunity to demonstrate how the proposed framework can be contextualised to different ICT4D projects that have not taken on a comprehensive approach to evaluation previously. Moreover, the ICT4RED initiative is in the process of handing over complete ownership of the project to the community and scaling the project to a wider region. Therefore, it is appropriate to conduct an Outcome and Impact Assessment to determine whether the project has indeed achieved its intended effects for scalability to take place. The lessons learned from applying the proposed Outcome and Impact Assessment framework to evaluate the ICT4RED project, are used to inform and revise the proposed framework. The next section (9.2) begins the reflective process based on the researcher's experience of applying the proposed framework in the SLL case study.

9.2. CASE STUDY 1: THE SIYAKHULA LIVING LAB

The Siyakhula Living Lab (SLL), which forms part of the Living Labs in Southern Africa (LLiSA) network, is an initiative operating in the rural Transkei in the Eastern Cape province of South Africa. It is situated in the area known as Dwesa, in the Mbashe municipality along the wild coast. The project was initiated in 2005 and is a collaboration of the Telkom Centres of Excellence (COE) at Rhodes University and the University of Fort Hare. The project is known for being multi-disciplinary, involving departments from Computer Science, Anthropology, Information Systems, Communication, Education, African languages,

Sociology, Journalism, and Media studies (Dugmore, 2012; LEDSa, 2011; Pade-Khene, Palmer and Kavhai, 2010; Siyakhula Living Lab, 2014a).

The SLL began work in the rural Transkei to contribute towards the development of the area and test ICT solutions that cater for the development of Dwesa. The name "Siyakhula", which means, "we are growing" in isiXhosa, was a name the community felt would best capture the expectations of the project for the development of the area. It emphasises the characteristic that the project is made up of multiple stakeholders all working together. It has grown to be a collaboration of academia, industry, government departments, and the Dwesa/Cwebe community, to "co-create, develop and field test a distributed, multifunctional community communication platform, to deploy in marginalised and semi-marginalised communities in South Africa" (Pade-Khene et al., 2010; Siyakhula Living Lab, 2014a). The SLL is working in collaboration with Rhodes University, University of Fort Hare, the Technology and Human Resources for Industry Programme (THRIP) of the South African Department of Trade and Industry, the Cooperation Framework on Innovation Systems (COFISA) between Finland and South Africa, the Meraka Institute, E-Yethu schools and Ikamva National e-skills Institute (iNesi). Researchers from both Fort Hare and Rhodes University implement ICT4D ideas and provide training, as well as, offer technical support for the technology deployed in the area. The involvement of the community in the SLL has assisted with the development and implementation of these ICT4D solutions (Dugmore, 2012; LEDSa, 2011; Pade-Khene et al., 2010; Siyakhula Living Lab, 2014a).

9.2.1. Background to Dwesa

The Wild Coast is considered an underdeveloped area in the Eastern Cape Province, despite it having great potential for ecotourism with its "unspoilt" landscape. It has a history of being deliberately underdeveloped as a labour reserve. From the last South African Census in 2011 (StatsSA, 2011), the Mbashe municipality was reported to be plagued with poverty, lack of infrastructure, high unemployment, low income, increasing health problems, and a lack of services (LEDSa, 2011; StatsSA, 2011). The local economy mainly comprises of subsistence farming and government grants. Households are mainly female headed, and community members depend highly on government grants and pensions (LEDSa, 2011; Pade-Khene et al., 2010; Mbashe Local Municipality, 2015).

From the Baseline Study evaluation report and the last South African census (2011) conducted, the community comprised mainly of residents over the age of 65 and below the age of 15. The

middle-aged generation migrate to towns to seek employment and a hope for better opportunities; leaving children behind with the elderly (Pade-Khene et al., 2010; StatsSA, 2011). Some community members voluntarily return to the village life, as they value "togetherness" and being close to family, and the simplicity associated with living in the rural area. Due to these various economic problems, social problems do arise, such as increased crime, and anti-social behaviour, such as, drunkenness and teenage pregnancies. These anti-social behaviours are also attributed to the poverty in the area; especially since the independence of South Africa, there was increased hope that the standard of living would improve. At the time of the Baseline Study, there was a "*sense of desperation ... for quick fixes*" (Pade-Khene et al., 2010*:* 269). This again demonstrates the need of the community to move beyond poverty.

9.2.2. SLL services to the Dwesa Community

The SLL is made up of a collaboration of research projects that aim to support existing development programmes. The SLL provides a platform for the co-creation of development solutions with the community. It provides telecommunication services to rural areas in South Africa, by deploying ICTs to schools (Siyakhula Living Lab, 2012). Service delivery in the area has focused on desktop computers and fixed line telephony, whereby school learners and community members have been gaining basic ICT literacy skills. The training conducted is based on Open Office Edubuntu software. The need for software products suitable for the SLL, led to the establishment of a software production house – Reed House systems. The focus of Reed House systems is the production of ICT solutions tailored for marginalised areas (ReedHouse.com, 2011; Siyakhula Living Lab, 2014a). Reed House systems works at industrialising ICT solutions that aim at activating local potential. A main output of Reed House Systems has been Teleweaver, which is a middleware platform on which various applications are run. Examples of applications include an ecommerce platform to assist in the selling of local products and services. However, the ecommerce platform had not been fully utilised by the community, as discussed in the Process assessment report, 2009. Teleweaver also incorporates more e-services to support the interaction with governmental departments, such as e-learning, e-health, e-governance, and e-judiciary. Such applications were aimed at aiding in providing a potential source of income for the community (LEDSa, 2011, Siyakhula Living Lab, 2014a).

The SLL points of presence are located at the schools in the Dwesa area. The schools are connected wirelessly to each other though fixed and mobile WiMAX. The schools in the area

have been chosen as they have the basic infrastructure required to run such a set-up, such as buildings with electricity. Furthermore, the schools are considered as central points where community members meet and have access to knowledge. Therefore, using these points as places to provide ICTs and ICT training opportunities is deemed appropriate. At its inception, the SLL operated in five schools. These schools included Mpume Junior Secondary School (JSS), Ngwane Senior Secondary School (SSS), Mtokwane JSS, Nondobo JSS and Nqabara SS. In 2012, the SLL then expanded to 11 more schools in the area. Figure 9.1 illustrates the current network structure at the Siyakhula Living lab main site, Dwesa. These 16 schools have been equipped with computers and connected to the Internet. They are all linked to the WiMAX stations located at the two base (Digital Access Nodes) schools – Badi and Ngwane (LEDSa, 2011, Siyakhula Living Lab, 2012). Figure 9.2 demonstrates the expanded Dwesa network.

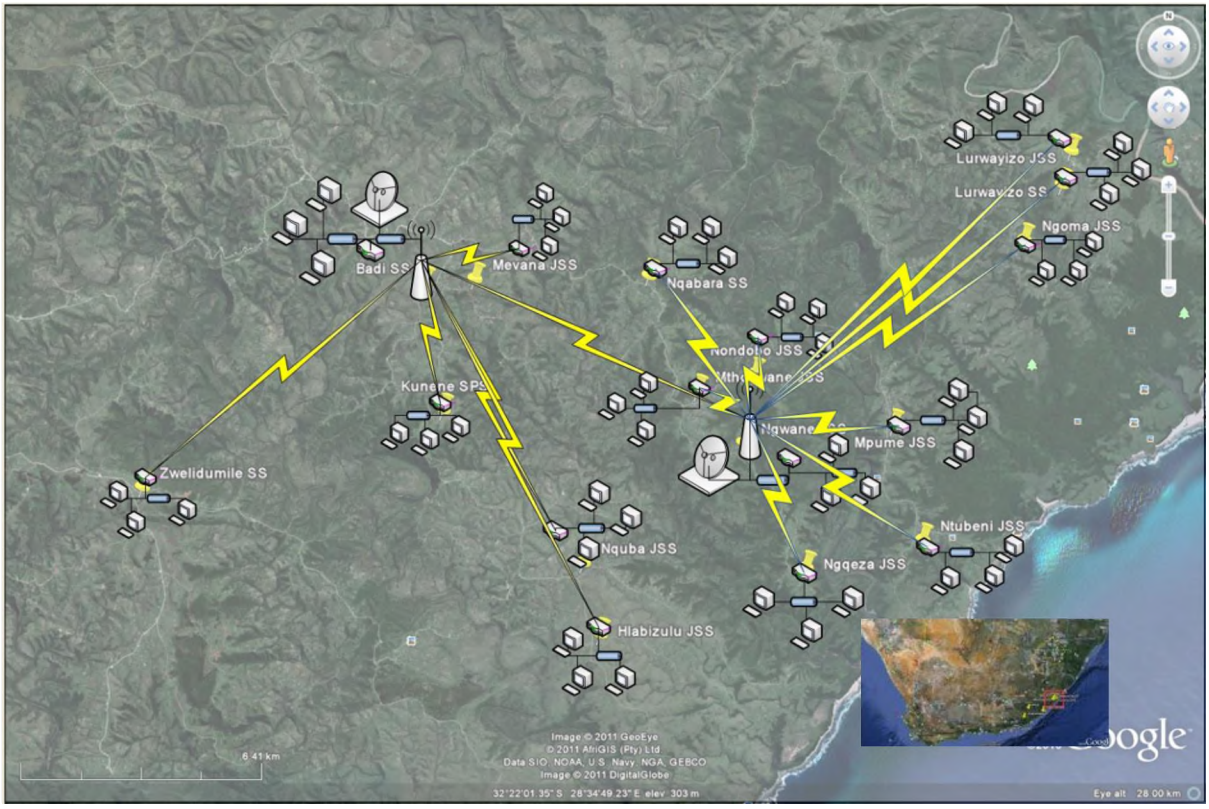


Figure 9. 1: SLL main site network diagram

(Siyakhula Living Lab, 2012)

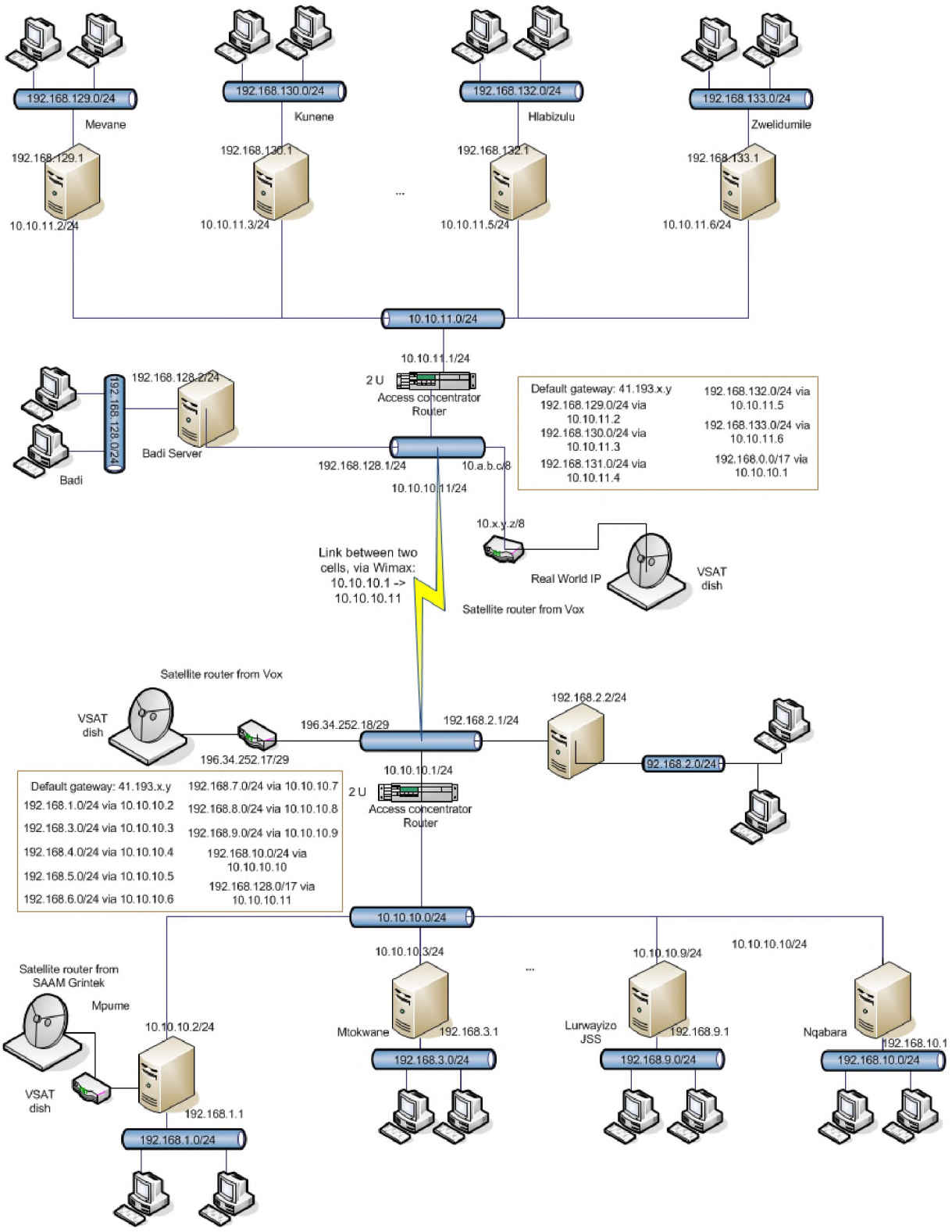


Figure 9. 2: Expanded Dwesa Network

(Siyakhula Living Lab, 2014b)

9.2.3. SLL Impact Theory

A programme's Impact Theory outlines the assumptions on the various chains of events that take place to effect change within a social condition the programme aims to address. It outlines the activities being delivered by the programme, and how those activities are expected to bring about improvements in the target population's circumstances. A social programme often has no control over the social conditions that it wishes to influence (Rossi et al., 1999). However, social programmes can influence immediate factors, such as: knowledge, awareness, and various manageable factors in the social situation, to bring about more long term positive change. It is a form of causal theory, which needs to be made explicit in a programme. It aids the evaluator to formulate evaluation questions to determine whether the programme has brought about its intended effects on the target population, and to what extent it has done so (Rossi et al., 1999). Furthermore, the Impact Theory brings to light the different outcomes that are expected (Rossi, et al., 1999). The SLL Impact Theory, which is depicted in Figure 9.3, outlines the goals of the SLL, which are separated into two columns depicting both outcomes and impacts.

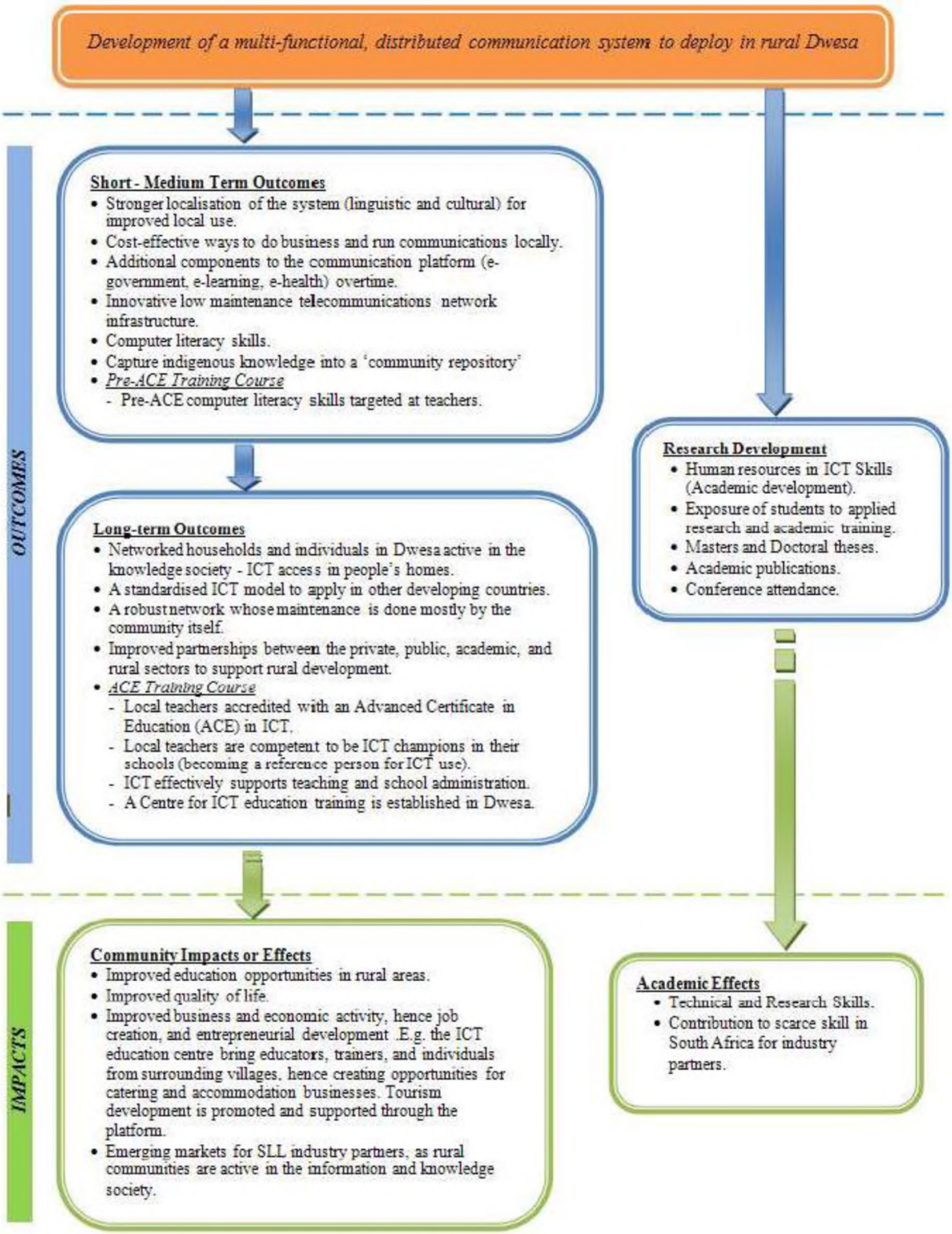


Figure 9. 3: Impact Theory – Access to knowledge and education

(Programme Theory Assessment report, 2009)

The first column illustrates the outcomes and impacts associated with the activities of the SLL in the community (Goal 1: To develop a distributed, multifunctional community

communication platform, to deploy in marginalised and semi-marginalised communities). The second column illustrates the outcome and impacts associated with developing technical skills of the project team within the ICT4D field (Goal 2: To equip people with technical and research skills in the field of ICT4D). The outcomes outlined in Figure 9.3 are intended to lead to the longer term impacts in the Dwesa community (Programme Theory Assessment Report, 2009). For purposes of this research, the Outcome and Impact Assessment conducted, focused on Goal 1 of the SLL, with particular focus on two points of presence (Ngwane and Nqabara), where the majority of the computer literacy training and other SLL activities took place. This research sought to develop an assessment framework for identifying the effects of ICTs on rural communities with a focus on the development of a community. Therefore, this research focused on Goal 1, which targeted the community and community development. Goal 2 of the SLL focuses on developing research capacity; specifically for the project team, and draws attention away from the target community. Therefore, to demonstrate the Outcome and Impact assessment framework the scope was limited to a community level (Goal 1) rather than at an academic project level (Goal 2). Future research can then look into the outcomes and impacts at the project level as well.

The SLL Impact Theory focuses on the need, "access to education and knowledge". From the Impact Theory, a key area recommended to improve education in rural areas is the Advanced Certificate in Education (ACE) programme. Through the ACE programme, teachers were equipped with computer literacy skills and skills on the integration of technology in the classroom, and were supported in their teaching and school administration skills, which was expected to lead to improved education opportunities in the area. Furthermore, through capturing indigenous knowledge and improving local use through culturally relevant services, a more standardised system can evolve that can span to a wider society. An identified challenge of education in rural areas from the Needs Assessment is the lack of support from Government service delivery. From Figure 9.3, the Impact Theory does outline the long-term outcome of improving partnerships with various government, public, and private entities. Through such partnerships, there is potential to improve rural education and create opportunities with different entities that are keen to improve the economic and social conditions in the community (Programme Theory Assessment report, 2009).

From the Impact Theory, one particular outcome was not considered feasible for aiding development in the community. The goal to have ICTs, particularly computers, in each household as a way to have individuals active in the knowledge society was not viable. It was

seen as costly for rural households to each afford and maintain a computer. Access to increased ICTs on their own does not guarantee positive impact on development in a community (Batchelor and Norrish, 2006; Toyama, 2015). Therefore, it was found to be more feasible to rather have access to ICTs at public access points, such as schools that are involved in community development activities or programmes.

9.2.4. Preceding Evaluations of the Siyakhula Living Lab

The Siyakhula Living lab has documentation on preceding evaluations conducted to date. Evaluations that stood out are the Baseline Study (2009), Needs Assessment (2009), Programme Theory Assessment (2009), and Process Assessment (2012). These evaluations informed the Outcome and Impact Assessment of the SLL, and therefore, provided the comprehensive element to the proposed assessment framework. In 2009, the SLL also had an impact assessment conducted as part of a Masters research study. The impact assessment was conducted separately from the Baseline Study, Needs Assessment, and Programme Theory that was carried out that same year. The impact assessment in 2009 aimed to identify the effects of the project on the community over the four years the project had been in operation. Moreover, prior evaluations provided project context on which the Outcome and Impact Assessment was contextualised to the SLL:

- **Baseline Study**

  The Baseline Study, conducted in 2009, assessed the state of the Dwesa community, in terms of its social, political and economic status, and the quality of life in the area. It further, highlighted the readiness of the Dwesa community to take up ICTs, taking into account the rural environment. This information on the state and readiness of the community aided in the development of possible solutions for alleviating poverty in the area and proposing solutions for the various challenges faced by the community.

- **Needs Assessment**

  The Needs Assessment, conducted in 2009, provided an understanding and elaboration of the needs, challenges, and development priorities of the Dwesa community. It was conducted in the initial stage of the SLL and was repeated as demand driven needs emerged overtime. The Needs Assessment also provided a platform for the project team to propose ICT solutions and services to identified challenges.

- **Programme Theory Assessment**

The Programme Theory Assessment, conducted in 2009, provided a description on the logical design of the SLL and whether it was designed to address the needs and development priorities identified from the Needs Assessment. A programme that is inappropriately planned can fail and therefore, an assessment of the plan of the SLL was important. The Programme Theory Assessment highlighted the Organisational Plan, Service Utilisation Plan and Impact Theory of the SLL. These components where assessed with a focus on the "access to education and knowledge" of the community.

- **Process Assessment**

  The Process Assessment, which was conducted in 2012, assessed how well the SLL was functioning as intended in its project plan. The SLL is faced by various external influences that affect how the project functions and therefore, it was important to determine how satisfactory the project processes were. The process assessment provided a descriptive account on whether the SLL was on the right track. It focused on the *service utilisation aspects* (ICT coverage and bias, user perception of ICT use, sustainable use factors, and training received by project recipients) of the project.

- **Impact Assessment**

  An impact assessment was conducted from 2008-2009 to determine the effects of the SLL on the Dwesa community. The assessment was conducted separately from the application of the RICT-CEF, which was being implemented in the project. Therefore, the assessment was conducted in isolation from prior evaluation findings. The current Outcome and Impact assessment is conducted four years after the impact assessment that was conducted in 2009. During that time, it is expected that continued outcomes and impacts have been emerging. Moreover, the current study relies on findings from prior evaluations, which provide a more holistic understanding on the effects of the SLL in the community. The 2009 impact assessment focused on the project effects with minimal reference to preceding evaluation information. As a result, the findings from 2009 did not provide much context or possible causal factors for the impacts identified. The impacts identified from the 2009 assessment were categorised under six categories: *Teachers, Learners, School Administration, Social Networking,* the *Digital Divide* and *Negative Impact.*

9.2.5. SLL Outcome and Impact assessment Evaluation Plan

The overall Outcome and Impact evaluation plan was flexible and allowed for adjustment throughout the evaluation process. The SLL project leader and project owner were informed of the outcome and impact assessment research, its purpose and its implementation within the

SLL. Moreover, the researcher informed the project champions, teachers and local evaluators on the evaluation and its purpose. The researcher, with input from the project champions, two community members and a project leader, performed the overall planning for the Outcome and Impact assessment.

To ensure effectiveness in the application of the outcome and impact assessment, all evaluation guidelines stipulated within the proposed framework were applied, see Section 9.3.1. The evaluator interacted with stakeholders and determined the various factors in the external environment that influenced the project during its lifecycle. The planning phase of the evaluation entailed presenting the purpose of the evaluation and the individual themes involved. Furthermore, the evaluator planned the evaluation process with stakeholders; namely project champions, as they were the most involved stakeholders and represented the project target recipients.

9.2.5.1. Outcome and Impact assessment process

The Outcome and Impact assessment process followed stems from the Rural ICT Comprehensive Evaluation Framework (RICT-CEF), which encompasses this current study. As outlined in the RICT-CEF the Outcome and Impact assessment process comprises two stages. Both stages are directly linked to the benefits and the drawbacks of the programme being assessed. The first stage focuses on the assessment of outcomes, which are the immediate and short-term effects of the programme. The second stage focuses on the assessment of impacts, which are the more long-term effects of the programme resulting from the Outcomes identified in stage one. Both stages follow the same process, with stage one occurring in the short term and stage two occurring in the long term upon the completion of stage 1. Within this study, both stage one and stage two occurred simultaneously. At the time of the current outcome and impact assessment, the SLL had been operating for seven years and therefore, both outcomes and impacts were being experienced in the community. As a result, the researcher assessed for both outcomes and impacts, whereby the impacts resulted from the outcomes identified as outlined in the SLL assessment report, in Appendix E. Figure 9.4 demonstrates the two-stage process for assessing outcomes and impacts.

1. *Engage with local and external stakeholders*: The evaluation followed a collaborative evaluation, which included various project stakeholders; see Section 9.3.1.1.
2. *Identify outcomes/impacts to measure*: Outcomes and Impacts identified for assessment were based on the key Outcome and Impact themes specified in the proposed Outcome and

Impact assessment framework. This entailed contextualising themes to suit the SLL context based on project documentation, such as prior evaluation reports, and information from stakeholders (Section 9.3.2).

3. *Plan the outcome/impact assessment*: The researcher engaged with project champions, the project leader and two community members to plan the assessment (Section 9.3.1).
4. *Gather credible evidence*: The researcher collected data from research participants. Four local evaluators assisted with the survey process of data collection. Data was collected through the use of interviews, participant observations, prior project documentation, a survey and narratives (Section 9.2.5.3 and 9.3.2).
5. *Interpret data regarding outcome and impact evaluation questions*: Outcome and Impact data was interpreted through various approaches. Outcome and Impact data was interpreted in the context of Baseline data, Needs assessment, Programme Theory assessment and Process assessment (refer to Appendix E)
6. *Disseminate outcome/impact data*: An Outcome and Impact assessment report for the SLL has been developed (Appendix E). The report will be distributed to internal and external stakeholders. Moreover, findings from the outcome and impact assessment of the SLL will form part of future research publications to inform a wider research audience.

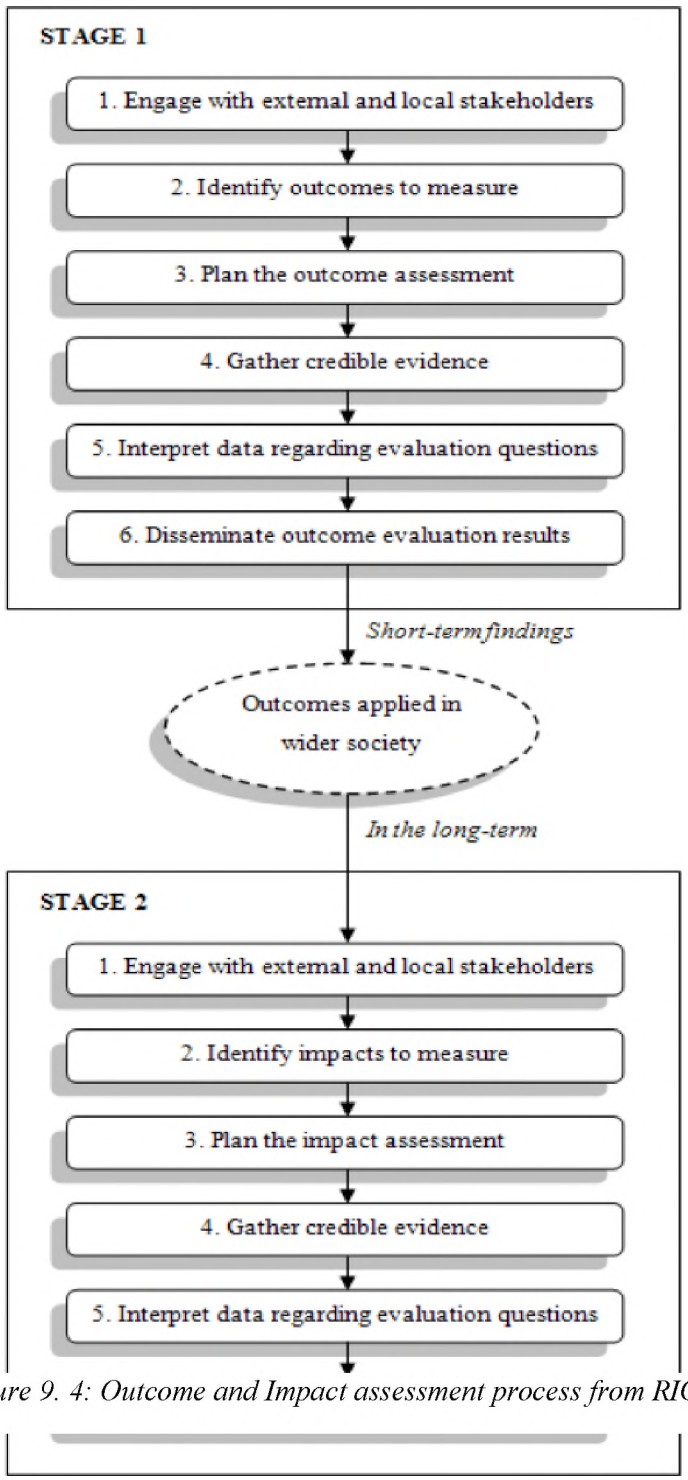


Figure 9. 4: Outcome and Impact assessment process from RICT-CEF

9.2.5.2. Evaluation Questions

The research questions that guided the Outcome and Impact Assessment were as follows:

1. Strategic Value

1.1 What strategic value is the project adding within the community?

1.2 Are project outputs equipping project recipients to achieve community goals?

2. Most Significant Change

2.1 What has been the most significant change that has occurred in the community

2.2 What would project recipients like to see differently as a result of the project?

3. Empowerment

3.1 Have the project recipients' informational, human, and social capabilities been expanded?

3.2 Have the project recipients' assets (psychological, informational, organisational, material, financial) been enhanced as a result of the project?

3.3 Has the project recipients' pool of choices been expanded as a result of the project?

3.4 Have the project recipients utilised the choices available as a result of the project and have desired results been achieved?

4. Livelihoods

4.1 What livelihood objectives were anticipated to be met as a result of the project? And have they been met and how?

4.2 Has the project aided in enhancing the project recipients' capitals?

4.3 Has the project affected the project recipients' livelihood strategies (ways of making a living)?

5. Sustainability

5.1 What measures have been put in place to ensure the positive outcomes and impacts are sustainable?

5.2 What measures have been put in place to mitigate the negative outcomes and impacts that have been observed?

9.2.5.3. Methods and Procedures

A variety of methods were used to collect data, refer to Appendix H. The researcher employed the use of interviews, participant observations, surveys, documentation and narratives. All instruments used were applied across all themes. Therefore, the researcher used the same instruments to elicit data for each theme. Moreover, all themes were assessed simultaneously. For example, during the interviews the researcher asked questions around all the themes. The five methods use to elicit data included:

- **Interviews**
  - Interviews were held with teachers and community members, where participants could detail the significant changes they have observed since the SLL began. Interviews also aided in eliciting information on whether people's capabilities were enhanced, and how ICTs affected their way of living.
  - Interviews with the project team and active project participants provided in-depth detail as to how the project is equipping the community to achieve its goals.
  - Lastly, interviews with the project team and management aided with identifying the measures put in place to ensure sustainability of project outcomes and impacts.
  - Interview participants were identified through a snowball sampling method. The project leader identified key project informants (such as the project champions at the target schools (3 project champions), two community members and six teachers) that would provide in depth details on the project. These informants were also in a position to recommend other project stakeholders that could engage in in-depth discussions about the effects of the SLL. The sample size was based on the discretion of the project leader. At the time of the research project there were only three active project champions at the selected schools and therefore, they all took part in the interviews. From the community members only two were willing to take part in the interviews. Some of the reasons for the minimal number of community members willing to be interviewed include bad weather restricting community members to travel to the schools, no real incentives to travel the distance to come for the interviews and limited interest in talking about the project.
- **Narratives**
  - Storytelling narratives from the high school children, who have been participating in the SLL, provided rich detail on the changes brought about by the SLL.
  - The principals for each of the schools selected the learners who should participate in the narrative exercise and therefore, the researcher worked with the learners that were available. Moreover, only learners in the senior grades at each school took part as they were the ones who were most involved with the use of computers at the schools.
  - The learners were requested to provide their views on the most significant change that they have observed in the community. They also provided recommendations on the changes they would like to see in the SLL.

- **Survey**
  - For the survey method, four local assistants were employed to assist with the construction of the survey instrument and the distribution of survey questionnaires.
  - Survey questions were distributed to community members to elicit a general view on how ICTs affected their way of living. Survey questions aided in gathering information from a wider group of community members, who have been affected by the project. It gave an overall idea on key empowerment areas that the project has brought about or undermined. Such information was then investigated further during the interviews.
  - Survey questions were used to determine whether community members are aware of the role the project plays in facilitating the attainment of community goals.
  - Survey questions with active project participants, aided with eliciting further information on the sustainability of outcomes and impacts observed within the project.
  - Survey participants were identified through a stratified purposeful sampling method. Participants were taken from both the Ngwane and Nqabara village. Selected participants comprised of people who took part in the SLL literacy training and participants who were not involved in the training. That way data collected incorporated varied views of the effects of the project from those who engaged in the project and those who did not or who utilised the services without attending any training. Local evaluators were employed to assist with the survey. They advised that it would be best to go from door to door of the different households in both villages. These households were selected based on their proximity to the two points of presence were the SLL is hosted. The reason for this is that these points of presence is where the selected households attend training and also make use of the SLL services being provided. Moreover, the participants from the different households were selected based on a snowball sampling method. The local evaluators gained recommendations from the people they surveyed on who they could elicit in-depth details about the project.
  - From previous research conducted in the area such as the process assessment (Process Assessment, 2012), it was noted that the two villages had a population of approximately 400 households. With a margin of error of 6.0,1 a sample size of 160 was determined. Each village had two local evaluators who distributed 40 questionnaires. Given the time limitations and that local evaluators would be walking to each household; 40 questionnaires were considered a suitable number to distribute. Moreover, each evaluator ensured that a maximum of two individuals were selected from each household to take part in the survey to avoid all data coming from a single household.

- **Participant Observations**
  - The researcher spent time taking part in the literacy training at Ngwane, Nqabara and Badi schools. The basic computer literacy training was conducted at these three schools (first at Ngwane and Nqabara, which then changed to Ngwane and Badi); which offered an opportunity for the researcher to engage with the project.
  - The researcher took field notes on how the project operated on the ground and the views and opinions of community members as they took part in the training.
- **Documentation**
  - Documentation of preceding evaluations aided in providing background detail on the various outputs the project produces to best position a community to achieve community goals.
  - Documentation of preceding evaluations, namely the Process Assessment, provided useful data on ICT usage and whether meaningful use has taken place, which may lead to outcomes and impact.

9.3. REFLECTIONS ON THE OUTCOME AND IMPACT ASSESSMENT OF THE SIYAKHULA LIVING LAB

The reflections on the Outcome and Impact Assessment of the SLL are discussed with reference to the structure of the Outcome and Impact Assessment framework. The proposed framework comprises three main components: Evaluation Guidelines, Outcome and Impact Themes, and Preceding Domains of Evaluation. Therefore, the researcher reflected on how the framework Evaluation Guidelines were applied; how the key Outcome and Impact themes were implemented; and the role that Preceding Domains of Evaluation played in contributing towards making the assessment process comprehensive.

The overall assessment of Outcomes and Impacts commenced over two years, from August 2012 to October 2014. A preliminary assessment, which focused on participant observations, ran from August 2012 to November 2013. Through the preliminary assessment, the researcher engaged in the SLL environment and with the various project stakeholders to understand the reality and the need for the assessment. Subsequently, a formalised assessment process was applied once the Outcome and Impact assessment tool was developed; hence, the finale period of assessment was conducted from February 2014 – October 2014. During the assessment period the researcher sought to identify how the SLL, and in particular the computer literacy training that was being offered, effected change in the community with the goal of facilitating

development. The Outcome and Impact Assessment looked at assessing, *Strategic Value, Most Significant Change, Empowerment, Livelihoods,* and *Sustainability*. All themes together demonstrated the change that has taken place in the community of Ngwane, Nqabara and Badi (the three points of presence of the SLL where the majority of the computer literacy training had been taking place). The computer literacy training at Badi only commenced in 2013, after it was decided that more community members could access Badi rather than Nqabara. Therefore, for the Outcome and Impact Assessment, data was collected from the three sites; however, with a focus on Ngwane and Nqabara where the training had been operating for the longest period.

The analysis and evaluation findings for the SLL were presented in an Outcome and Impact Assessment Report (refer to Appendix E for a complete Outcome and Impact Assessment Report). The Outcome and Impact assessment Report presents a description of the effects of the SLL on the Ngwane and Nqabara community. The following topics are covered within the report:

a) Prior evaluation findings
b) The needs of the target community
c) Communication patterns in the community
d) Outcomes and impacts based on the themes: *Strategic Value, Empowerment, Livelihood* and *Sustainability.* The findings for Most Significant Change were incorporated within the Strategic Value, Empowerment and the Livelihoods discussion.

9.3.1. Application of Evaluation Guidelines

The evaluation guidelines provided useful principles to follow for the Outcome and Impact Assessment to be effective. The researcher took into account the following:

- *Stakeholder relationship* – The researcher considered different project stakeholders to plan the assessment process and elicited their views on the data collection instruments and how best to collect the data.
- *External environment* – The researcher considered the external context in which the SLL operates and how this may affect the Outcome and Impact Assessment results.
- *Preceding domains of evaluation* – The researcher considered preceding domains of evaluation that have taken place in the SLL and how they inform the outcome and impact

themes. These included the Baseline Study, Need Assessment, Programme Theory Assessment and Process Assessment.

- *Ethical considerations* – The researcher considered the ethical implications of conducting the study and the effect of the research on the Dwesa community.

9.3.1.1. Stakeholder Relationship

The researcher collaborated with the community, and project team to implement the Outcome and Impact Assessment. The evaluation process took on both a participatory and empowering role, engaging various stakeholders in the project. Engaging with the different stakeholders aided with formulating questions for interviews and survey questionnaires. The stakeholders had an opportunity to engage with the process and ensure that the researcher has considered different perspectives. The researcher also had an opportunity to discuss the expectations from the evaluation and identify preferred means to communicate with the stakeholders who assisted with the evaluation process. The overall development of the data collection instruments involved going through a four-stage process, categorised into Participatory Evaluation and Empowerment Evaluation:

Participatory Evaluation

Stage 1: As part of the evaluation planning process, the researcher met with the project champions and teachers at Ngwane. The researcher presented the purpose of the evaluation and the individual assessment themes to the above stakeholders. The aim of the meeting was to discuss potential questions for each theme, and outline the key issues to take into consideration during the assessment. Furthermore, the researcher discussed potential methods suitable to assess each theme, taking into account the cultural appropriateness of each method.

Stage 2: The interview guides and the survey questionnaire were distributed to the project management team; namely the project leader and project founder. The project leader and founder provided their views and opinions on the methods being used and the type of evaluation questions being asked. This process aided with fine-tuning the data collection instruments. Moreover, having had the project founder approve the methods used and the type of questions asked, he highlighted the need to consider the funding implications when assessing the impact of the project. He noted that in general, Outcome and Impact assessments tend to overlook the financial aspect of ICT4D projects. Although, ICT4D initiatives have good intentions and plan to meet development needs in different communities, the amount of funding available influences the achievement of project goals. There often is a limited pool of funds available for

the various development initiatives. Therefore, the type of outcomes and impacts identified should also take into consideration the amount of funding that was available. For example, if a project only achieved some of its intended outcomes, it is possible that was the best the project could do, given the funds available. Such feedback was useful for assessing the Sustainability theme, in terms of the funding available for ICT4D initiatives, which was not made explicit initially.

Stage 3: The researcher conducted a pilot of the questionnaires with a social development programme in Grahamstown, South Africa. The programme aims to equip unemployed single mothers from the Grahamstown community with various skills, including computer literacy skills. These women come from marginalised backgrounds and share some similarities with the Dwesa community. For example, they all came from an isiXhosa background and they attended computer literacy training in the hope of gaining new skills to effect change in their lives. The pilot mainly aimed at revising the data collection instruments such as, the phrasing of survey questions. Moreover, having conducted the pilot study, the researcher gained first-hand experience at interviewing community members and engaging with the research instruments. As a result, the researcher could iron out any interview habits that prevented the respondents from feeling comfortable and fully expressing themselves. For example, appearing nervous; not elaborating questions; or giving the respondents sufficient time to think through their responses, were factors that prevented respondents from expressing themselves naturally.

Overall, the project champions, teachers and project leader were supportive of the idea of conducting an Outcome and Impact Assessment, to raise awareness on how the project is performing. They had minor concerns with the initial questions proposed by the researcher. As a result, the researcher only made slight modifications to the data collection instruments. However, the project leader was concerned that the survey instrument was rather long. Given that the community, especially Ngwane and Mpume, has been over-researched, community members were not always enthusiastic to constantly talk about the project and engage in various interviews with research students. Consequently, the project leader advised the researcher to shorten the survey instruments and simplify it further. Furthermore, the project champions and the project leader were able to assist the researcher with identifying key informants in the project.

Empowerment Evaluation

Stage 4: The research provided community members with an opportunity to engage more actively in the data collection process itself and also gain research skills. The researcher had assistance from four community members (two from both Nqabara and Ngwane), who played the role of local evaluators. The four community members, who were recommended by the project leader, assisted with the survey data collection process from various households in the Nqabara and Ngwane communities. The researcher went through the survey questionnaires with the local evaluators. The process of approaching community members, assisting community members in completing the survey and eliciting their permission to collect data was discussed. The aim was to ensure that all questions were clear and that the local evaluators could understand the survey instrument in order to explain to community members. The researcher trained the local evaluators on how to go about completing the questionnaires. They were tasked with conducting a "trial run" with two randomly selected community members; whereby they had an opportunity to identify any challenges in the process. They were also provided with the isiXhosa translation for all the questions in order to internalise what was being asked. The training helped with preparing and equipping the local evaluators with everything they needed to conduct the survey successfully. The feedback gained from the local evaluators informed the final revision of the questionnaires, before data collection commenced from the various households in Ngwane and Nqabara.

As part of the distribution process, the local evaluators had notebooks to reflect on the data collection process, which they shared with the researcher. Key aspects that stood out from their reflections were:

- Conducting a survey with different households as part of an Outcome and Impact Assessment is a good way to gain a variety of views on how the project is performing.
- A few community members did not wish to take part in the survey as they did not wish to be provided with potato crisps (as a thanking gesture), as they completed the questionnaires, as though they were little children.
- One of the local evaluators indicated that they were quite keen to be involved in the data collection process, as it has given them some experience on how to go about conducting the practical aspects of collecting data. She plans to enrol for an honours degree in education and views that her assistance in the SLL will add value to her honours work she plans to pursue.

The use of narratives (story telling) as a method for data collection also gave learners the opportunity to voice their opinions and add value to the overall evaluation. The opportunity to narrate about the project and suggest ways to improve and change the project gave learners the confidence that their opinions do matter.

9.3.1.2. Application of Comprehensive Evaluation: Reference to preceding domains of evaluation

The following evaluation reports: the Baseline Study, Needs Assessment, Programme Theory Assessment and the Process Assessment of the SLL were available to the researcher. They were useful in contextualising the data collection instruments and scoping the data collected from the evaluation.

- **Baseline Data and Needs Assessment Data:** The Baseline Study and Needs Assessment report provided useful benchmark data. They were a good reference point to determine whether change has taken place in the community and the degree of change that has taken place. Furthermore, these reports also provided data on whether the changes that have occurred where in accordance with what the community expected and in accordance to the goals of the community.
- **Programme Theory Data:** The Programme Theory Assessment report outlined the expected causal chain of events expected to bring about the anticipated impact. Details on the expected causal chain of events assisted with formulating and planning the Outcome and Impact Assessment instruments. The causal chain of events that were identified from the Programme Theory (refer to Appendix D3), were key features to be aware of during the Outcome and Impact Assessment. The Organisational Plan from the Programme Theory Assessment highlighted the key functions and activities of the SLL management unit. However, the functions and activities of the management unit were kept at a high abstract level and did not go into much detail as to what these activities are. In this aspect, it is lacking sufficient depth to guide the planning process of the project. As stated in the shortcomings from the Programme Theory report, "the SLL needs to also be able to evaluate the stakeholders' functions and activities, so that they can all collaborate to guide and improve the living lab overtime" (Programme Theory Assessment Report, 2009:13). A key activity that the SLL partakes in with the community to achieve community goals, such as access to education and knowledge, is the computer literacy training they offer. A shortcoming identified from the Outcome and Impact Assessment has been the lack of

awareness on how to apply the basic computer literacy gained, to complement livelihood activities and development. The type of training offered to community members is not structured sufficiently. As a result, the training offered is a mere transfer of basic skills on how to use Open Office Writer and Calc, and the Internet. Beyond this, community members do not know how to move from a stage of knowing how to use a computer to a stage of leveraging these skills to achieve development goals. This filters from the Programme Theory, which does not outline clearly the activities and functions of those involved in the literacy training aspect of the living lab. Another shortcoming from the Programme Theory Assessment is, "*the computer literacy training either needs to have an agenda for eventually supporting specific development activities, or it should occur simultaneously with other capacity building programmes targeted at development*" (Programme Theory Assessment Report, 2009:19). These findings from the Programme Theory report aided with understanding why community members do not fully integrate their computer literacy skills to complement their development goals.

As outlined in the SLL Service Utilisation Plan in Programme Theory the *Advanced Certificate in Education* (ACE) training programme targets teaching and administration skills for teachers. This training has been beneficial in equipping teachers with the capacity to integrate ICTs in the schools. Teachers are then expected to provide training to other teachers and community members. However, this has not been applied in full effect. Only a minor group of teachers have been willing to take time to train community members. Furthermore, community members are also not willing to take part in the train-the-trainer initiative, as they expect to be paid. The ACE programme appears more structured and is complemented by the pre-ACE course, which is for basic computer literacy for the teachers. As a result, it is mainly the teachers, especially those who took part in the pre-Ace and ACE programme, who have identified the positive outcomes and impacts. It can be seen from the Programme Theory Assessment that there where shortcomings in the programme design. These shortcomings may explain why the type of training offered to community members is not complementing development or capacity building programmes in the area.

- **Process Assessment Data:** The Process Assessment report was the most referred to domain of evaluation. The Process Assessment demonstrated that the project expectations would lead to particular outcomes and impacts, and that the project was ready for an impact assessment. It provided relevant use, user satisfaction and user perception factors. These factors aided in identifying the causal chain of events that lead to outcomes and impacts. It

also helped with identifying the target population who made use of the project facilities. As mentioned previously, the target population is required to make use of the project facilities before outcomes and impacts can be expected. Moreover, the reflections made from the process assessment were useful in conducting the impact assessment. For example, from the Process Assessment the external evaluator at the time identified that the local evaluators preferred to wear uniforms so that they could be identified in the community. The uniform would indicate that they were part of the project and that they were not complete strangers. That way, community members felt more comfortable to answer questions. As a result, the local evaluators that were selected for the Outcome and Impact Assessment were women that were known in the community to be involved in the project. Two of the women were recommended by the project lead and have been involved in the project actively. One was actively involved in the training and had started her own cosmetic business online as a direct result of the project. The second was active in the training and known in her community. The community associated these two women with the project and, therefore, community members were at ease with being interviewed by them. The third evaluator is the project champion at Nqabara; while the fourth is an HIV/AIDS community care worker. These women found it easy to approach community members and go to each household with ease and talk to community members as they were familiar faces in the community.

The preceding evaluation reports were conducted in the past (Baseline Study, 2009; Needs Assessment, 2009; Programme Theory Assessment, 2009; Process Assessment, 2012; and Impact assessment 2009); however, all information was still considered relevant for the Outcome and Impact assessment conducted. For example, the Process Assessment was conducted two years prior to the Outcome and Impact Assessment being conducted. Therefore, the "usage" factors, from the assessment of Service Unitisation, might be considered outdated at first glance. However, as part of the Outcome and Impact Assessment, the researcher conducted some general descriptive data collection. The results determined "usage" factors, which mimicked those from the Process Assessment. Consequently, the results from the Process Assessment are still relevant.

All preceding domains of evaluation aided in contextualising questions for the interviews, narratives, and questionnaires. The Outcome and Impact Assessment framework outlined generic questions to consider for the evaluation. It further provided guidelines on the types of questions to ask for assessing each theme. Therefore, referring to the *Baseline Study*, *Needs Assessment*, *Programme Theory Assessment* and *Process Assessment,* the researcher gained a

holistic picture of the context in which the Outcome and Impact Assessment would take place. It further aided in particularising each theme to the specific project and formulating appropriate questions. This was also useful as the researcher had not been involved in the project from the very beginning.

9.3.1.3. External Environment

The preceding domains of evaluation provided the researcher with background context on how the external environment had been changing. The preceding assessments also gave the researcher context on factors that may influence the resultant outcomes and impacts. For example, the Department of Education awarded the teachers in the area with laptops. The Department further requested that all future school reports be submitted in electronic format. As a result, the teachers were externally motivated to engage in the project and desire to learn how to use computers. Furthermore, teachers at Ngwane had to attend a workshop to demonstrate how they are integrating technology in their teaching. Such workshops contributed to the teachers' active involvement in the training, and further understand how to utilise technology for their teaching purposes.

Moreover, the Dwesa community continues to be plagued with poverty and high unemployment in the area. Such factors in the external environment explain the desperation for quick fixes that the community has adopted, and the need to gain certificates after the training. Therefore, several trainees were seen as merely going through the training to gain a certificate to add to their CVs for job application purposes. There was minimal internalising of the computer literacy skills to facilitate one's livelihood strategies.

9.3.1.4. Ethical Considerations

Involving stakeholders in the planning of the evaluation ensured that participants were not taken advantage of, and their views and opinions were considered. The researcher interacted with the SLL project champions who gave advice on the channels to go through to complete the evaluation process in a manner that does not offend the community. This ensured that the evaluation process did not go against any cultural norms or undermine any of the participants' beliefs and views. Research participants, therefore, engaged freely with the research process and were willing to assist the researcher with the Outcome and Impact Assessment.

Through engagement with project participants, the researcher was able to keep research participants informed of the research. The researcher explained the purpose of the research and the role the participant would play upon consent to take part in the research. Furthermore, all

participants were informed of any risks and benefits involved, if any, for taking part in the project. The participants were informed of the methods for protecting their identity and all confidentiality and anonymity concerns. The researcher further provided the participants with information on the social implications of the research. The previous information was provided in writing and translated into isiXhosa, as well. Furthermore, the information was provided verbally with reference to the printed copy of the information. Before each interview and survey questionnaire process, the researcher and local evaluators spoke to the participant and discussed the various ethical matters related to the research. This provided each participant with an opportunity to ask questions about the research and clarify anything they did not understand. Participants were then presented with a consent form indicating that any data provided will be treated in an ethical manner and will not expose their identity if they so wished.

9.3.1.5. Challenges encountered from Evaluation Guidelines

The teachers and project champions, with whom the researcher was planning the evaluation, placed the majority of the evaluation planning responsibility on the researcher. They had no suggestions for changes to the methods selected and the type of questions asked. Although they did provide some feedback, the researcher got the impression that they were not as interested in the evaluation process. There was an impression that the outcomes and impacts of the project are obvious to identify and there is no need to have a formal evaluation process that is formally captured. They appeared to willingly agree with the researcher's suggestions. This had been identified as a problem, mainly due to the area being over-researched. Teachers and project champions appeared bored to take part in the assessment, given that numerous students have been coming to the area to conduct various research projects. As a result, the project champions and teachers at Ngwane and Mpume in particular were tired of being interviewed and being asked about the SLL. Furthermore, there appeared to be a slight fear from some teachers (two teachers) to take part in the interviews and the evaluation process. They feared they might say something they cannot take back. For example, one interviewee mentioned *"once it's on record it cannot be taken back"*.

9.3.1.6. Lessons Learned from the application of Evaluation Guidelines

Engaging with stakeholders aided with finalising the data collection instruments: Collaborating with various stakeholders is an opportunity for the researcher to engage and gain the opinions of the stakeholders on how to conduct the evaluation process. However, given that the SLL has been over researched in the Mpume and Ngwane area, the project champions and teachers who are directly involved in the project, showed minimal interest in the planning

process. As a result, the researcher was responsible for the majority of the planning. The researcher had to be prepared and propose possible data collection instruments and questions, which the project champions and teachers reviewed. After reviewing the data collection instruments, the project champions and teachers were happy for the Outcome and Impact Assessment process to continue.

Working with the project management team gave the team awareness of what the researcher sought to do. The project team where kept in the loop and were aware of what was happening. Furthermore, the researcher gained good references through the project leader. Involving teachers, project champions and community members in the evaluation planning process helped gain different perspectives on the evaluation process. It helped gain useful feedback on different considerations to take into account. The project leader found the evaluation questions to be relevant; however, she had a view that the questions were quite lengthy and might need to be summarised to not tire out the interviewees. Successful engagement with development related projects involves working closely with community members (Maxwell, 1999; Markey et al., 2010). Involving stakeholders, whose lives are to be impacted by the project, yields more successful project operation. Therefore, community members should participate in any evaluation related work as they have insight from an "insiders" perspective, such as the case of planning data collection instruments for impact assessment.

Engaging with stakeholders gave the researcher the opportunity to grasp the project: Working with the project leader and project champions aided with familiarising the researcher with the project. It aided with the transition from being a complete outsider to being someone the community became acquainted with. Furthermore, taking part in the computer literacy training gave the researcher first-hand experience on some of the key project activities.

Project recipients, particularly project champions, are key informants for planning an evaluation: Engaging with stakeholders during the evaluation planning process created an environment where stakeholders played an advisory role for the overall research process. Stakeholders particularly project champions were in the capacity to recommend key informants who could take part in the research, the appropriate channels to follow to successfully complete the research and recommend methods for data collection. This speaks to the process of conducting ethical research. Therefore, project recipients should guide the manner in which outcome and impact assessment work is conducted (Patton, 2013). For example, the local evaluators who were employed to assist with the survey instrument advised the researcher that

it would be best to collect data from the different households in the village to get a good overview of the effects of the SLL on the community. Project champions are key stakeholders who are interested, committed, and knowledgeable and often have a direct stake in the project. Therefore, they are key users of the evaluation information (Patton, 2013). Identifying key users and stakeholders in a project is important for ensuring their engagement and ownership of the evaluation process. Moreover, the evaluation is more likely to be utilised, and therefore, produce more meaningful data (Patton, 2013).

Collaborating with stakeholders creates an opportunity for empowerment evaluation to take place: Project champions highlighted that their involvement in the evaluation process was an opportunity to learn about research. For example, one project champion planned to pursue an honours degree in education and wished to take part in the evaluation process to gain exposure on the various techniques of conducting research. Her involvement in the outcome and impact assessment gave her the opportunity to gain first-hand experience on the different aspects involved in conducting research related work. Through a collaborative evaluation approach, project stakeholders also gain the skills required to lead and conduct future evaluations. Evaluations can influence various change processes and outcomes. Evaluation goes beyond *use* to cover concepts such as evaluation influence (the consequence of evaluation). Therefore, evaluation processes or findings can "cause some change in the thoughts or actions of one or more individuals" (Henry and Mark, 2003: 297). For example, the project champion who through engaging in the evaluation process saw it as in opportunity to learn about conducting research related work. Therefore, the outcome and impact assessment process does influence the stakeholders that engage in the assessment process (Henry and Mark, 2003).

Preceding evaluation data is relevant for contextualising the outcome and impact assessment framework: Data from the other domains of evaluation was utilised as a means to contextualise the various data collection methods employed. Moreover, preceding evaluation data aided the researcher in scoping findings from the Outcome and Impact assessment. For example, data from the Needs assessment and the Programme Theory assessment aided the researcher to particularise the specific outcome and impact themes to suit the SLL and gain relevant findings from the assessment process.

9.3.2. Application of Outcome and Impact Themes

9.3.2.1. Assessing Strategic Value

It is important for ICT4D initiatives to demonstrate how they align themselves within the broader scope of development in an area (Hamel, 2010). Therefore, Strategic Value sought to evaluate the value the SLL was adding to the community and how the outputs of the project were equipping its recipients to achieve their overall goals. The assessment of Strategic Value aimed to identify the ways in which the community was being equipped and positioned to achieve the goals they desired, as outlined in the SLL Needs Assessment. Examples of community needs that were being targeted, were increased eco-tourism in the Dwesa area, improved knowledge and education in the area, improved business and economic activity, and improved communication means in the area. Therefore, the assessment of Strategic Value considered how the target recipients in the SLL were prepared to achieve improved access to education and knowledge, improved communication means and improved economic activity in the area. The assessment considered the alignment between the services being offered by the SLL, especially the computer literacy training (the primary service provided by the SLL in the Dwesa area) that was offered and the needs of the community. Moreover, Strategic Value considered any new development possibilities that may have emerged because of the computer literacy training that had been occurring.

9.3.2.1.1. Methods and Procedures

The approach used to assess the Strategic Value theme included both qualitative and quantitative approaches. The researcher incorporated Document Analysis, Questionnaires, Interviews, and Participant Observations as methods to collect data.

Document analysis

The definition of Strategic Value highlighted the need to refer to preceding evaluations in the SLL that referred to the services provided by the SLL to the Dwesa community. Moreover, Strategic Value required that the researcher understood the chain of events that took place between the SLL services being offered and the needs of the community being met. Therefore, preceding evaluation documentation was studied. The assessment of Strategic Value was namely informed by, the Needs Assessment, Programme Theory Assessment and Process Assessment, which points to the comprehensive approach being applied in this study. Reviewing these documentation on preceding evaluations and documentation on the project background was anticipated to give details on project services and project needs. It would

provide a platform to review the value the project is adding and understanding how the community is being prepared to achieve their goals as defined by Strategic Value. All project documentation was freely available from the project team and therefore, the researcher planned to acquire all the preceding evaluation reports and also acquire various publications of the project from the SLL website and the SLL project leader.

Questionnaires

In order to have an overview on the alignment between project services and the goals of the community, the researcher had to determine what the SLL services were from the perspective of the community. Through survey questionnaires, the researcher aimed to identify high-level themes and gain a common understanding of the value the SLL was adding in the community. The researcher particularised the definition and aims of Strategic to suit the SLL context. Survey questions were tailored with reference to the project context to identify the value the project was contributing to the community. All questions were designed based on the definition of Strategic Value. The researcher went through all questions with the project team and two community members to determine the appropriateness of questions and refine the survey instrument, refer to Section 9.3.1.1 on details on the process followed to finalise the survey instrument. Working with the project team and community members to finalise the survey instrument served valuable and added value to refining the instrument to better suit the SLL context.

Interviews

The researcher planned to gain in-depth insight on the effects of the project from those who experienced the project. Interview questions were structured in accordance to the definition of Strategic Value and the aims of the theme. Each question was then contexualised using project documentation and observations made during field trips. Questions focused on the types of project outputs experienced, the desires/needs of the community, what people valued in the project and ways in which the project could be improved to achieve community needs. During the assessment planning stage, the project champions provided their opinions of the preliminary questions for Strategic Value. Preceding project evaluations and extensive project documentation made the contextualisation process quite straightforward. Moreover, the input from project champions aided in refining the interview questions.

Participant observations

The researcher planned that participant observations would be an opportunity to have first-hand experience of the project services being offered and also the interaction of the community with the project. The researcher spoke to the project leader to attend several trips to the project site in Dwesa and engage in the literacy training that was being offered to community members. The researcher planned to observe the training offered, the ways in which lab facilities were utilised, and the needs the community aimed to achieve (through casual conversations during field trips).

9.3.2.1.2. Data Collection

The data collected comprised of survey data, interview data, participant observation data and documentation data:

Documentation Data

The Baseline Study, Needs Assessment, Programme Theory Assessment, and Process Assessment were studied and provided the researcher with a basis on which to understand the goals of the community and where the community was coming from. The SLL Needs Assessment report and Process Assessment report provided the researcher with details on the different project activities and outputs offered by the SLL. The researcher was then able to compare the services offered and the outputs of the SLL with the needs of the community. The aim of the comparison was to determine whether there was an alignment between the services offered with the needs of the community. Furthermore, through the assessment of Strategic Value the researcher was able to see the SLL Impact Theory (from the Programme Theory Assessment report) in action and see whether intended outcomes and impacts were emerging. The researcher was then able to review if there was an alignment with reference to the Programme Theory, which indicated the chain of events required for outcomes to occur. The Programme Theory and the Programme Theory assessment were useful guides for understanding the value the project was aiming to add and whether indeed that was occurring. However, the researcher found that the SLL Programme Theory was kept at a high level, which posed some challenges for tracing detailed chains of events for outcomes and impacts to occur to compare with what was happening at the time of the assessment. This therefore, indicated that the alignment between project services and project outcomes/impacts was not sufficiently planned.

All preceding evaluations further aided in contextualising the questionnaires and interview guide to understand how the community was being prepared to attain their development goals

as outlined in the Needs Assessment. The Programme Theory Assessment, and Process Assessment focused on the need "*access to education and knowledge*". Therefore, the assessment of how well the SLL is functioning (Process Assessment) and the design of the project (Programme Theory) did not consider all the community needs outlined in the Needs Assessment report. As a result, the researcher needed to take into account that the SLL was not only equipping community members to attain that one need, based on the Programme Theory and Process Assessment. Moreover, the researcher had to consider utilising other instruments such as interviews and participant observations to augment data from the Document analysis.

Survey Data

As the SLL has been in operation since 2005, there have been quite a number of community members who went through the computer literacy training. As a result, not all community members could be interviewed and not all community members were willing to take part in the assessment process. The survey provided a quick method to elicit views from a large number of community members. Moreover, the Likert scale options provided made it easier for community members to quickly highlight what stood out for them in terms of the SLL services being offered. The survey questions included questions on the SLL services offered in order to understand what project activities the community was engaging in. Furthermore, the survey sought to elicit the views of community members on their awareness of the project activities and their motivation, or lack thereof, to achieve their goals through the SLL. The researcher was then able to map the services offered to: the level of engagement of community members with those services, and the fulfilment of their needs.

The researcher had assistance from four local evaluators who distributed survey questionnaires to different households in Ngwane and Nqabara. The local evaluators were familiar with the two villages and were able to approach different households with ease. For each household, they ensured that they did not elicit the views of more than two people. The purpose for this was to try to cover a wider range of households in the area. Furthermore, the local evaluators ensured that they elicited the views of community members who took part in the SLL computer literacy training, engaged in the project services and those who did not, with the majority being those who took part in the training. The purpose was to ensure that the responses from the questionnaires were representative of the community and not just those who took part in the training or utilised the services. Moreover, community members who did not take part in the SLL training could provide feedback on what they had observed in the community concerning the SLL's presence. The local evaluators assisted community members in completing the

questionnaires and took extra notes on their experience while distributing the questionnaires. Their experience and feedback revealed that the distribution of survey questionnaires in the area was a good way to gain a general overview of the community's opinion of the SLL services offered.

Interview and Participant Observation Data

The researcher gained the most insight from interviews and participant observations. Data obtained included: how community members were offered computer literacy skills and how community members utilised these skills. From 2012-2014 the researcher observed and reflected on the literacy training and other project activities, such as, the assessment of community members' computer literacy skills, the manner in which project services (availability of desktop computers and the Internet) were utilised by teachers and community members. Through this process, the researcher was able to map how the computer literacy training and use of project services related to community goals, as outlined in the definition of Strategic Value. Through various trips, the researcher assisted with training of community members, following instructions from the project leader. Additionally, participant observations provided the researcher an opportunity to observe how people engaged with the SLL activities, such as, the training. Through this process, the researcher also had the opportunity to interact with community members and engage in informal conversations about the SLL and the training offered. Community members felt at ease to have casual conversations about the training and what they did with the skills they acquired after the training.

However, the researcher experienced challenges during the training. The researcher did not go through any formal training on how to teach basic computer literacy to rural communities. Furthermore, the researcher could not converse effectively with community members, as most community members felt more comfortable conversing in isiXhosa. Therefore, the researcher experienced difficulties explaining computer terminology to community members. These challenges were characteristic of the SLL environment, as the student volunteers from Rhodes University and University of Fort Hare do not go through training (to teach) before conducting the literacy classes. Moreover, not all students can converse in isiXhosa; as a result, the field trips are often divided into groups of students who can communicate in isiXhosa. Although these were challenges experienced, the researcher had first-hand experience on the actual events that took place on the ground, and how they influence the outcomes and impacts of the project.

During the interview discussions, community members could suggest alternative means in which they felt they could be equipped to achieve the goals they desire. For example, one teacher suggested that the SLL should provide a direct link to potential employers for trainees that performed well in the course.

The researcher interviewed the project champions, teachers, community members and project management team to elicit their views on the SLL strategy and the type of project outputs produced. The views of the project champions and project management team were sought; as they were the most actively involved in the project and were aware of the project services to the community. Project champions and community members further provided their views on current project outputs and on the attainment of their goals based on the computer literacy training offered as the key SLL service provided. Stakeholders further provided details on how they would change project activities in order to experience the goals they desired. The researcher was able to corroborate the details from the interviews with the data from the Programme Theory and Process Assessment concerning the services offered and the project outputs.

9.3.2.1.3. Data analysis

The researcher was solely involved in the analysis and interpretation of the data. The researcher conducted a thematic analysis of the interview, and participant observation data. A thematic analysis provided a qualitative account of the SLL services offered to the Dwesa community. Such data helped describe in detail the ways in which the community was positioned to attain their goals. From the thematic analysis, it was identified that computer skills development; increased awareness of the emerging possibilities of technology; and a change in attitude were themes that stood out among the community. Moreover, survey data was captured in excel and statistically analysed using the SPSS software for descriptive frequencies. Frequencies of the community's training habits, such as, whether they have enjoyed training and whether people understood the role the SLL played in the community, were captured.

9.3.2.1.4. Lessons learned

Participant observations provide a relaxed environment to engage with community members and elicit their opinions about the services being offered by a project: From the data collection process, the participant observations were most fruitful. The researcher gained insight on what was occurring on the ground and could interact with the different community members. During participant observations the researcher partakes in the context under study and becomes

accepted as a natural component of the culture they are immersed in (Batchelor and Norrish, 2005: 26; Department of International Development, 2005: 12; Wieman, Gast, Hagen and Van der Krogt, 2001: 5). As a "natural component", one is accepted by the community, which opens doors for open engagement to occur. Furthermore, as community members became accustomed to the researcher they began sharing their experiences in the SLL and also providing suggestions on how things could be done differently. The researcher could also observe that the type of services offered by the project did not reflect what was originally planned in the Programme Theory Assessment. Observations allowed for unintended outcomes and impacts to be identified, which were not original planned for by the project team as outlined in the Programme Theory.

The Strategic Value of a project should be clear and clearly communicated to community members: The aim of assessing for Strategic Value is to determine the alignment between the services offered by the project and the goals the community desires to achieve. Community members have more confidence in a project when they see that the services offered by the project can be utilised in a practical manner. For example, the interviewee who advised that it would be best if the SLL could offer opportunities that absorb the literacy skills taught. That way, community members will be able to see the value of the skills they are acquiring. Therefore, it is important for evaluators to be aware of this alignment between services offered and goals of the community; and capture this information for project improvement. In light of the above, understanding the "why factor" will aid in project development (Pfeffer and Sutton, 2000). Understanding why particular services are offered will aid in determining if there is an actual need for that service and provides a clearer understanding where and how the project services will suit a particular context, Therefore, the value a project is adding should be clearly communicated (Pfeffer and Sutton, 2009).

An Outcome and Impact assessment informs other domains of evaluation: Findings from the Outcome and Impact assessment process can inform subsequent iterations of the RICT-CEF application. For example, outcome and impact findings highlighted emergent needs as a result of the SLL, which calls for a subsequent iteration of the Needs assessment process to take place. Moreover, findings from the Outcome and Impact assessment can confirm and reiterate findings from other domains of evaluation. For example, from the assessment it was found that the SLL Programme Theory was too abstract and needed to be further unpacked to have a more meaningful impact take place in the project. This confirms the findings from the Programme Theory assessment that was conducted in 2009 and confirms the need to address this challenge

(SLL Programme Theory report, 2009). As outlined in the RICT-CEF (Khene and Sewry, 2011) the outcome and impact assessment has a direct feedback loop to the Process Assessment domain of evaluation. It further informs the Efficiency Assessment and Scalability Assessment (Khene and Sewry, 2011). From its design, the Outcome and Impact assessment domain is expected to inform other domains of evaluation. However, from the RICT-CEF there is no direct loop to the Needs Assessment domain, which was identified from this study as an essential addition to the RICT-CEF.

9.3.2.2. Assessing Most Significant Change

Most Significant Change (MSC) aims to describe the substantial change that has occurred in the community, because of the project. The assessment of MSC provides the project recipients the opportunity to freely express their views on the most significant change that had occurred in the community. It also provides project recipients the opportunity to suggest and describe changes they would like to see in the project. Within the SLL, there are aspects of the project that the project recipients view as significant. This information can aid in further understanding what outcomes and impacts the project recipients find valuable.

9.3.2.2.1. Methods and Procedures

The assessment of MSC was informed by the need to understand the project recipients' view on changes in the community that they considered to be significant. Data collected employed a focus group, interviews, and story-telling techniques. These techniques provided the project recipients the opportunity to freely express their views in a descriptive manner, which allows room for unintended outcomes and impacts to emerge.

Focus group

The researcher had planned to host a focus group at each project site. The focus groups were planned to be in the form of unstructured interviews with stakeholders to share their accounts of what they view as the most significant change that has taken place and why. Moreover, through focus group discussions the researcher hoped to engage participants in discussions on changes they would recommend the project embraces going forward. The researcher planned to invite those community members who made use of project facilities and engaged in the project to take up time on a non-training day to come to the Ngwane and Nqabara lab to discuss the project. The researcher planned that the focus group should not clash with the training and to avoid overwhelming project recipients with a busy schedule. The researcher spoke to the project champions at Ngwane to plan the focus group session. However, they indicated that it

would be difficult to get community members to come for the focus group as they would need a strong incentive (for example a financial one) to travel all the way to the lab to talk about the effects of the project in the community.

Interviews

Through interviews, the researcher planned to gain in-depth insight on changes in the community as a result of the project. Through interviews the researcher planned to draw attention to what community members considered important and what aspects they valued in the project. The interviews were kept open-ended to allow community members to express themselves freely and allow room for unintended outcomes to emerge.

Storytelling

Stories often provide a rich description from the point of view of the community members. Furthermore, such an assessment identifies unintended outcomes and it may aid in identifying why a particular change has occurred. The researcher planned to engage school learners in a storytelling exercise, to express their views about the project. The researcher could not engage learners in formal interviews as the majority of their day was spent in classes and various school activities. To avoid disrupting the school schedule, the researcher decided on the story-telling exercise, which the learners could complete at any time without interfering in their school activities.

The researcher approached the principals at the schools to discuss the opportunity to have learners write narratives. The principals were willing to have learners engage in the assessment process. The principals at each school then referred the researcher to a teacher who could assists with the data collection process. Teachers were quite keen to engage learners. They felt it was a good opportunity for leaners to showcase their English writing skills.

The teachers selected 10 learners from each school to complete the story-telling exercise. Prior to the learners writing the narratives, the teachers informed the learners of the purpose of the exercise. Learners were then provided with consent forms to present to their parents/guardians and gain their approval. Once parents/guardians approved the storytelling process the learners set aside their own time to complete the stories and submit stories to their school principals.

9.3.2.2.2. Data Collection

Focus group

The focus group unfortunately did not occur. The researcher had difficulty accessing community members who had already completed training, to come freely as a group to discuss

the projects effect on the community. There was no incentive for community members to take up their time to travel to the project site as they felt there was no immediate tangible benefit. As the SLL has had several research projects take place, the communities interest in research related work had diminished. Community members had no real incentive to travel to the training site to take part in a discussion on how the project was performing. The researcher later found that it in future it would be best to have a focus group immediately after a training session, before community members return to their homes. That way they do not have to travel to the school (for some it is a long distance) exclusively for the focus group, especially when there is minimal interest shown in evaluation type work amongst the community. However, such an approach only gains access to community members who are undergoing computer literacy training at the time. It excludes those community members who have already completed training and those who have not attended training, yet make use of the SLL services.

Interviews

Assessing for Most Significant Change was straightforward and it gave community members the platform to express themselves according to what was most important to them. Community members, teachers, and project champions shared their views on what they viewed to be the most significant change that had occurred in the community. They also shared their views on what they would change within the project. Through this exercise, the researcher was able to identify unintended outcomes and impacts and identify what the community found to be of value. In the early stages of the interview process, community members felt comfortable talking about the changes they had experienced or observed in the community since the inception of the SLL. They were then able to talk about changes they would recommend for the project to be improved. Interview participants were at ease talking about changes in the community, as it seemed natural for them to tell a story about the SLL. However, two of the interviewees gave the impression that they could not express all the changes they would recommend as it appeared that they felt they were badmouthing the project and not appreciating what the project was doing.

Storytelling

The learners from Ngwane, Nqabara and Badi were given the opportunity to write narratives about the SLL. School learners were comfortable with writing narratives on the SLL, whereas adults preferred to talk about the significant changes rather than write stories, as they found it to be less tedious. The focus was on the major changes they have experienced within the

project. Stories provided a rich description of the SLL from the point of view of the learners. They were not limited in what they could share and they felt free to express themselves honestly. They were not required to indicate their identity and therefore honest were honest in their expressions. The storytelling technique provided a rich description of the significant changes in the community. The data collected could be discussed as part of Strategic Value, Empowerment, and Livelihoods. For example, a common significant change that has occurred in the Dwesa community was the computer literacy training that occurred. This particular finding forms part of Strategic Value as it is a feature of the SLL services to equip community members to achieve their goals.

The researcher noticed that the selection process of school learners by the teachers were biased. The teachers at all three schools selected learners who could converse in English and had good marks. The teacher wanted to ensure that the learners selected had good marks and where "good" representatives of the school. That way the learners would not "embarrass" the teacher if they gave "wrong" answers. The researcher had to clearly explain to the teachers that the selection process should be random as the assessment was to gain insight on the views of learners and clearly explain that there is no wrong answer. Therefore, learners could write as they wished and in either isiXhosa or English.

9.3.2.2.3. Data analysis

The data was thematically analysed and common threads were identified to be the most significant from the perspective of the community. As part of the data capturing process, the researcher elicited the services of a translator to translate narratives that were written in Xhosa. The researcher found that learners who wrote in Xhosa (mother tongue) expressed themselves more freely than those who wrote in English. The researcher identified that the feedback for the assessment of Most Significant Change could be categorised as either a component of Empowerment or Livelihoods.

9.3.2.2.4. Lessons learned

The assessment of Most Significant Change should be a method incorporated within the assessment of Strategic Value, Empowerment and Livelihoods: Through the assessment of MSC it was found that the MSC experienced by community members could be categorised as part of Strategic Value, Empowerment or Livelihood, rather than a standalone theme. For example, one key change the community notices as most significant is the good image and attention the community gained through the project. Creating a good community image and

gaining attention can be categorised as a form of empowerment, as the community's self-confidence is being enhanced. MSC should then be collapsed as a stand-alone theme and it should be rather emphasised as a method within the other themes. An evaluator should then assess for most significant change as an essential method.

The assessment of Most Significant Change creates an environment for unintended outcomes/impacts to emerge: Most Significant Change is known as a participatory monitoring and evaluation technique (Tabassum and Yeo, 2015). A recent study on measuring tangible and intangible impacts of ICTs in development contexts highlighted that the use of MSC aided in exploring the hidden and intangible effects of project on both users and non-users (Tabassum and Yeo, 2015). Moreover, a key benefit of the method is the ability to identify unintended outcomes/impacts through storytelling (Batchelor and Norrish, 2005; Department of International Development, 2005). The assessment of MSC was a fruitful exercise as it gave project recipients the platform to freely express their views about the project. It also gives recipients the opportunity to highlight the aspects of the project they value or would value if change were to occur. Through this exercise, several unintended outcomes were identified.

9.3.2.3. Assessing Empowerment

The assessment of Empowerment aims to identify how community members' capacity to make choices and transform choices into desired outcomes has been enhanced. It is important to understand how the Dwesa community's lives have been transformed and how the SLL has influenced their ability to make and transform choices into desired goals, as outlined in the Needs Assessment. The assessment of Empowerment aimed to answer questions centred on the expansion of participants' informational, social, and human capabilities. This was conducted with respect to the different needs the SLL was targeting, such as: the need for improved health in the area, enhanced access to knowledge and education, improved communication in the area, improved opportunities for business and employment; and improved engagement with the social sector. Moreover, the assessment of Empowerment considered whether the project recipients' assets (psychological, informational, organisational, material, and financial) had been enhanced, since taking part in the SLL, in order to make purposive choices that transform their lives.

9.3.2.3.1. Methods and Procedures

The assessment of Empowerment elicited data through the survey questionnaire, interviews, participant observations, and preceding evaluation documentation. All instruments were

informed by the definition of Empowerment as defined by the Outcome and Impact assessment framework itself. Empowerment comprised of three main components: ability to make purposive choices and transform choices into one's desires; the enhancement of informational, social, and human capabilities; and the enhancement of psychological, informational, organisational, material, and financial assets. Each instrument was tailored around these elements that made up the definition of Empowerment. For example, all interview and survey questionnaire questions were structured in such a way that they identified outcomes and impacts related to the different elements of Empowerment. Moreover, prior evaluations in the SLL informed the data collection instruments for Empowerment. Documentation on preceding SLL evaluations provided useful context data that aided the researcher with contextualising each instrument specifically to the SLL.

Survey questionnaires

The majority of the survey instrument comprised of indicators for the assessment of Empowerment. The survey aimed at gaining a general view from the community on ways in which people's informational, human and social capabilities have been influenced by the project; and how their ability to make choices had been affected by the project. The survey questionnaire was designed to capture data on how information accessed via the Internet had empowered the community to transform their choices into desired outcomes. Moreover, the questionnaire was designed to elicit the views of the community on whether their capabilities had been enhanced. As part of their human capabilities, questions around one's self-esteem and sense of self-worth were adapted from the Community Wellness Outcomes (CWO) toolkit proposed by Gomez, Reed and Chae (2013). The toolkit provided questionnaire instruments for assessing self-esteem, self-efficacy, social relations and civic engagement, which worked well for the study. Research participants found the questions straightforward and could engage with that aspect of the instrument. The researcher focused on the self-esteem and self-efficacy aspect for assessing the *enhanced Human Capability* element of Empowerment.

The researcher structured questions based on the three main components of Empowerment by breaking down each component into its particulars and formulating a Likert scale for each particular aspect. The researcher aimed to determine whether the different elements of Empowerment were present in the SLL. Moreover, the researcher gained the assistance of the project champions and two community members to finalise questions for the Empowerment theme, refer to Section 9.3.1.1 for details on ways in which the survey instrument was finalised.

Interviews

The researcher anticipated that interviews would elicit in-depth insight in the ways in which people's capabilities and decision making capacity was affected or influenced by the project. Interview questions were structured around the components that define Empowerment. The interview process involved identifying outcomes and impacts related to one's ability to make choices and transform choices into desired goals; and whether one's informational, human and social capabilities were affected by the project. Through reference to project documentation, the researcher was able to contextualise the interview questions to further suit the SLL context. Two project champions reviewed the initial interview questions prior to the interviewing process. They were able to help refine and clarify any questions that did not make sense. The project champions were the most active participants in the SLL, and therefore, had insight to identify empowerment questions that were not relevant to the SLL. For example, questions around engaging with the political sector and enhancing one's capability to do so were restructured, and some eliminated, as it was viewed that the SLL services indirectly spoke to that specific need.

Participant observations

The researcher planned to observe the various activities project recipients engaged in at the project points of presence. The researcher had planned that observations would provide her with first hand insight on the ways in which peoples informational capabilities have been affected and in turn influence their human and social capabilities. Much like with the assessment of Strategic Value the researcher made field trip arrangements with the project leader to be involved in project activities, such as the computer literacy training in order to observe as a participant in the research context.

Documentation

The researcher planned to review project documentation in accordance to the variables that define the project recipient's informational, human and social capabilities. Prior evaluations were anticipated to provide the researcher with an overall view on the various community member's human, social and informational capabilities that were influenced by the SLL. That way the researcher could also tailor Empowerment related questions more appropriately. Through the review of preceding documentation, the researcher aimed to determine the elements of Empowerment that were relevant to the SLL. The researcher also aimed to gain insight on the SLL context, which would act as a benchmark to inform findings related to Empowerment and provide meaning to Empowerment related findings. Much like with

Strategic Value, documentation on different project details was freely available from the SLL website.

9.3.2.3.2. Data Collection

Survey questionnaires

Survey responses comprised of data on how access to information has affected their way of living and their day-to-day activities with specific reference to the elements of Empowerment. The survey data provided frequencies on community member views on the effect of the SLL on their social, human and informational capabilities. The researcher encountered a few challenges with the survey data collected for the assessment of Empowerment. It was identified that for the open-ended sections of the questionnaires, some community members gave "fancy" answers to impress the researcher. They felt as though they were being tested on their knowledge of the SLL and therefore, did not wish to provide "wrong" answers. For example, there was a case whereby one of the survey responses was a snippet from a newspaper article on what the newspaper mentioned about the SLL. The respondent chose to provide the views of those from the newspaper article instead of their own views about the SLL. This reiterates the observation that some community members chose to try to impress the researcher with "correct" answers. Moreover, the researcher realised that community members preferred to have questions more personalised in terms of the way they were phrased in the survey. For example, instead of asking:

"Do you feel proud to use the computer facilities through the SLL"	**Strongly agree**	**Agree**	**Does not Apply**	**Disagree**	**Strongly disagree**

Community respondents preferred the questions to be phrased as:

"I feel proud when I make use of the computer facilities through the SLL"	**Strongly agree**	**Agree**	**Does not Apply**	**Disagree**	**Strongly disagree**

It was found that they felt they owned the question more and could answer more truthfully. The researcher also found that when she provided respondents with cues for different questions, such as, giving examples of ways to engage with government, the respondents felt limited to those cues/examples. As a result, respondents felt as though they could only speak about the

examples provided as part of the survey questions and not fully reflect on what was occurring in the community. Moreover, it was found that respondents were more inclined to answer the open-ended sections of the questionnaire when the local evaluators were present. The local evaluators would then ask the participant the open-ended questions and write out the responses for the participant. This worked well for those community members who were not interested in writing out answers. Most open-ended responses were provided in isiXhosa as community members felt comfortable conversing in their home language. Formulating the questions in the form of Likert scales provided the participants with a general outline of Empowerment. It further made it easier for participants to identify, with ease, which elements of Empowerment were relevant to the SLL context. The survey instrument also included open-ended qualitative sections where participants were expected to provide a brief elaboration on their responses to the yes/no questions. For example, if a respondent felt that access to knowledge through the SLL assisted them in earning more income then they could elaborate on how this occurred. This opportunity to provide context and meaning to their answers was beneficial in understanding the ways in which individuals were empowered or not empowered through engaging in the SLL services offered.

Participant observations and Interviews

The data collected from the interviews and the participant observations elaborated the types of empowerment the community members, teachers and project champions experienced through the SLL. The project champions from both Nqabara and Ngwane, and selected teachers and community members were interviewed to share their opinions on how their human, social, and informational capabilities had been enhanced or not enhanced, as a result of taking part in the SLL activities. Data was also captured on how people were not empowered in cases where empowerment was expected to take place. The SLL project leader and project champions referred the researcher to the majority of the interview participants. The project leader, one project champion from Ngwane, and the project champion at Nqabara had insight on suitable candidates for the interviews and assisted the researcher with arranging times to conduct the interviews. Through this process, the interview participants selected were willing to be interviewed and were comfortable talking about the SLL. The interview participants were known to have assisted in past research endeavours in the SLL and therefore, felt free to engage with the Outcome and Impact assessment interview process. The researcher had the view that these interview participants were more honest as they felt comfortable during the interview process.

During the computer literacy training, the researcher observed how community members and teachers utilised their computer literacy skills and ways in which informational capabilities, such as the ability to generate own knowledge and disseminate information, were affected by the project. The researcher also observed community members who came to utilise the Internet services at the schools. The researcher kept in mind ways in which community members accessed information for decision-making, information associated with their informational, social and human capabilities, and information associated with their assets, as discussed in the Outcome and Impact Assessment framework. The researcher also engaged in casual conversations with community members as they attended the computer literacy training. Through these conversations, community members and teachers shared their stories on the different elements of Empowerment that they felt were applicable to their lives.

Documentation

The researcher sought evaluation data from preceding documentation on the needs and goals of the community, and information on how well the project was implemented as intended. The researcher studied evaluation documentation with specific reference to what Empowerment entailed as outlined in the Outcome and Impact Assessment framework. Documentation from preceding evaluations aided in explaining the different types of empowerment observed and discussed during the interviews, based on the Programme Theory, Needs Assessment and Process Assessment. The Baseline Study and Needs Assessment provided the researcher with data on the desires of the community, which acted as a benchmark for determining the levels of empowerment that community members and teachers were experiencing. Documentation on information pertaining to ICT use and information literacy obtained from the SLL Process Assessment informed the researcher on ways in which informational capabilities were enhanced. Moreover, the Impact Theory (from the Programme Theory Assessment) outlined the cause-and-effect sequence of SLL activities. This sequence demonstrated areas where Empowerment was expected to take place and therefore, highlighted the areas to pay attention to during the assessment of Empowerment.

9.3.2.3.3. Data analysis

The survey data was analysed for frequencies based on a Likert scale. This data was used to describe the types of empowerment that people experienced. The questionnaire's open ended questions were thematically analysed along with the interview data and participant observation data. The thematic analysis identified themes related to the empowerment of community members. One difficulty encountered was the explicit separation of outcomes and impacts. The

outcomes identified could be categorised as immediate, intermediate and long term. However, the distinction between these was found to be quiet hazy. The separation between immediate outcomes, intermediate outcomes and impacts could not be made explicit as the move from immediate outcomes to impacts was a gradual process. Furthermore, for each impact identified it was found that multiple outcomes contributed to its development over time. As a result, it further made it difficult to discuss outcomes and impacts as complete and separate entities.

9.3.2.3.4. Lessons learned

Community members should be encouraged to complete surveys based on their own experiences: Researchers should ensure that research participants are aware of the purpose of the research and importance of providing their views in a safe environment. Researchers should keep in mind that "if you ask someone to tell his or her life story, will what you get be in that person's authentic voice, or in a voice that he or she thinks you might be looking for?" (Atkinson, 2003: 133). In light of this, survey respondents should be encouraged that there is no wrong answer when completing a questionnaire. Therefore, they should provide their own personal view of the project, even if it is a negative view.

Survey questionnaires should be phrased in such a manner that community members own the questions being asked: Questionnaire questions should be personalised and phrased in first person. Such a slight adjustment in the way questions are asked encourages an atmosphere of ownership of the questions and comes across less as a question that requires a "correct" answer.

Outcomes and Impacts should not be presented in isolation from each other: During the write-up of the report on Outcome and Impact Assessment, the discussion of outcomes and impacts should be presented together to reflect the gradual development of immediate outcomes into impacts. In the process of providing feedback on the outcomes and impacts identified all impacts should be discussed in relation to their outcomes they emanate from. Furthermore, an attempt to have outcomes and impacts explicitly separate takes away from having a holistic picture of what happened. Instead an evaluator may be left with isolated outcomes and impacts that do not provide a full story on what occurred. For example, the case of the young lady who began her own cosmetic business in the area as a result of engaging in the SLL services offered. She had access to computer literacy training, which lead to sustainable use of the computer facilities, which lead to improved access to employment information and employment opportunities, which lead her to sign up for a cosmetic business opportunity online, which lead to her ordering her products and paying for them online, which lead to her selling her products

in the area and earning an income. This chain of events demonstrates how outcomes and impacts are associated as a continued/gradual process that occurs overtime and therefore, cannot be discussed in complete isolation. The outcome of gaining basic computer literacy skills and impact of starting her business and earning an income was best described in relation to one another rather than keeping the outcomes and impacts in complete isolation from each other. That way the discussion was meaningful.

9.3.2.4. Assessing Livelihoods

Livelihoods broadly assess the way in which one makes a living. Livelihoods would aim at answering questions centred on changes in one's livelihood objectives and wellbeing, and the way in which people protect themselves against vulnerability. The assessment of Livelihoods within the SLL focused on the community's livelihood objectives that were anticipated as a result of engaging with the SLL services. Moreover, Livelihoods considered the SLL recipients' livelihood strategies employed to achieve livelihood objectives. This included considering how the computer literacy training and availability of services affected the community's capitals.

9.3.2.4.1. Methods and Procedures

The instruments used to assess for Livelihoods were informed by the definition of Livelihoods. The researcher formulated questions centred on whether the community's livelihood strategies were influenced by the SLL and whether the wellbeing of community members was affected through engaging with the computer literacy training offered and utilising project facilities. The Baseline Study and Needs Assessment aided in identifying the livelihood objectives of the community and the strategies people employed in order to make a living. The data collected was elicited through the survey questionnaire, interviews, participant observations, and preceding evaluation documentation.

Survey Questionnaire

Survey questions were aimed at eliciting the views of the wider community to gain a general overview on the ways in which the wellbeing and livelihood strategies of community members were affected. This process was in accordance to the discussion on Livelihoods from the Outcome and Impact Assessment framework. Much like the previous themes, project documentation and preliminary observations aided with contextualising questions to suit the SLL. Questions were specifically tailored to identify the livelihood strategies people employed

in the community and ways in which people made a living and the ways in which the SLL affected that.

Interviews

Interviews were held to discuss how ICTs aided in maximising community members' income and their livelihood strategies to achieve their livelihood objectives; such as, improved health, literacy, technical skills, agricultural skills, education, and entrepreneurial skills. The researcher hoped to gain in-depth details on ways in which the SLL influenced people's livelihoods. Interviews were held with teachers and project champions and select community members. All interview questions were tailored to elicit views on the different elements that made up the definition of Livelihoods, as outlined by the Outcome and Impact assessment framework.

The researcher gained assistance from project champions to construct the interview guide. Project champions were the most informed and involved community members. They could therefore identify Livelihood questions that were not relevant to the community. For example, questions on culture (component of wellbeing) and the effect of access to computer facilities and use of the Internet has had on their culture were considered to be less significant.

Participant observations

The researcher planned to observe how teachers and community members utilised the computer facilities at the labs. The researcher planned to gain first-hand experience on how people utilised their skills (if at all) as part of their livelihood activities. Through this process the researcher aimed to identify themes that were relevant to Livelihoods. The researcher could also identify themes that were discussed in the interviews and themes that the researcher could probe further in interviews.

Documentation

The researcher planned to review prior project documentation and evaluation reports. This process aimed to keep a comprehensive approach to evaluating Livelihood outcomes and impacts. The researcher further planned to use project documentation as a lens through which to understand Livelihood findings that are identified. All project documentation was made available on the SLL website and by the project leader.

9.3.2.4.2. Data Collection

Survey questionnaires

As part of the survey questions, community members were asked about their assets and strategies employed to make a living. This information was elaborated on during the interview sessions. From the definition of Livelihoods, the majority of Livelihood assessment questions required descriptive explanations. Therefore, only a small portion of the survey instrument comprised of Livelihood questions. The majority of the assessment of Livelihoods occurred through interviews and participant observations.

Data from the survey was centred on the use of ICTs and its influence on the community's culture and income generating patterns. Once again local evaluators assisted community members with the completion of the questionnaire by clarifying any Livelihood questions the community did not understand and writing out the open-ended answers if the participant so wished. The open-ended aspects of the questionnaire revealed some insight into the ways the community utilised their skills to seek employment or become self-employed. Much like the assessment of Empowerment, community members preferred to have questions phrased in such a way that they felt they were specifically tailored for them.

Interviews and participant observation

Interviews were the most useful tool to gain data for the assessment of Livelihoods. Respondents shared their experience on ways in which they have utilised ICTs as part of their way of living. Participant observations were not as useful, as the researcher only engaged in this exercise during the computer literacy training sessions. During the training exercises, the researcher was only able to observe what occurred during the training. Therefore, minimal observation of community members accessing the lab facilities to support their livelihoods, took place. For example, it was only once in a while that the schools had few community members who came in to conduct business online. There were other teachers and few community members, who have already been through the training, who come to utilise the lab facilities. The researcher then had the opportunity to engage in informal discussions with them to ascertain how their livelihoods had been influenced by the SLL. Moreover, it was mainly teachers, who during the training would come into the labs to quickly access the Internet to complete their research assignments. For example, some teachers were completing their Honours in Education degrees through distance learning, and therefore, had assignments to complete with the aid of the Internet.

Minimal Livelihood outcomes and impacts were observed, given that project services were not customised to specific community needs. From the assessment of Strategic Value, it was

observed that improvement was needed in the alignment between project outputs, such as, the provision of computer literacy skills, and the desired community goals. For example, as discussed in the SLL Outcome and Impact assessment report (Appendix E), the literacy training offered was a mere transfer of skills on how to operate a computer. The training itself was not contextualised enough in line with the goals the community desired to achieve. As a result, community members had few experiences to share with regards to the SLL and a positive change in their way of living. A large number of respondents experienced minimal change in their livelihoods through the SLL. Furthermore, the levels of empowerment experienced by the community influenced the degree to which their livelihoods where affected. For example, community members whose confidence in their abilities was boosted engaged more with the project facilities, and were more motivated to leverage their skills to positively influence their way of living. From the interviews, community members emphasised the employment and income generation aspects as part of their livelihood strategies.

Documentation

Reviewing prior evaluations assisted the researcher with keeping a holistic understanding on the Livelihood outcomes and impacts that were identified from the Outcome and Impact Assessment. The researcher consulted the *Baseline Study,* and *Needs Assessment* reports of the SLL, which provided background (benchmark) data on the way of life within the community. The researcher reviewed these reports to identify aspects that informed the assessment of the livelihood strategies the community employed, their daily activities and their wellbeing with reference to the SLL.

Data from the Baseline Study, Programme Theory and Process Assessment added value to understanding why particular Livelihood outcomes and impacts had occurred or not. These reports provided the researcher with benchmark data to assess whether intended Livelihood related change had taken place. Moreover, these reports provided data on the type of livelihood strategies the community engaged in. The researcher could then investigate further how these livelihood strategies were enhanced or undermined as a result of the SLL services. The Process Assessment was also consulted, which provided data on ICT use factors and perceived usefulness of the SLL services. Such information explained how community members were not aware of the potential value ICTs contribute (directly or indirectly) to supporting their livelihoods. As a result, the researcher has a better understanding as to why in some cases the SLL services had no effect on the community's Livelihoods.

9.3.2.4.3. Data analysis

The survey data comprised of open-ended sections for the assessment of Livelihood. The open-ended responses along with the interview responses were thematically analysed for the Livelihood outcomes and impacts that stood out among the community. Once again the researcher encountered difficulties separating outcomes and impacts as explicit and complete separate entities. Furthermore, several impacts resulted from more than one type of outcome, which at first made it difficult to separate the data and present outcomes and impacts as separate silos.

9.3.2.4.4. Lessons learned

The alignment between project outputs and community goals is important for understanding the types of Livelihood outcomes and impacts experienced by community members: The assessment of Strategic Value aided the researcher in understanding the minimal change that had occurred amongst the community in terms of their way of living, for example, their way of making an income. It was observed from the data analysis that due to the poor alignment of project services with community goals, the livelihood outcomes and impacts experienced were minimal. Moreover, the type of empowerment experienced does influence the livelihood outcomes and impacts that do develop. Therefore, it is beneficial to assess for empowerment when aiming to understand the ways in which ICTs have influenced one's way of living.

Low engagement of project recipients, such as project champions, in the management of the project influences their engagement in the sustainability of project outcomes and impacts: Project champions who should be involved in the management of the project should be aware of the existing ways in which project outputs, outcomes and impacts are being sustained. A top down approach to management creates an atmosphere whereby project recipients feel they cannot contribute towards the sustainability of the project and subsequent improvements in the project (Hosman and Fife, 2008). As a result, project ownership is minimised and evaluation use limited (Patton. 2013). For example, the project champions at the target schools were not aware of the future plans of the SLL and the measures that had been put in place to sustain positive project effects. Therefore, they felt they could not provide detailed suggestions for future sustainability as "it was not their place" to make such suggestions.

9.3.2.5. Assessing Sustainability

Sustainability assesses the extent to which positive outcomes and impacts are sustainable. The assessment highlights the measures put in place to ensure that positive outcomes and impacts

are not short lived. Where negative outcomes and impacts have been identified, the assessment of Sustainability further assesses the extent to which these negative factors are not sustained. The assessment then draws attention to ways in which these negative outcomes and impacts are being mitigated. The SLL Outcome and Impact Assessment identified several positive and negative outcomes and impacts. Therefore, it is important to assess the ways in which the positive outcomes and impacts are sustained and therefore, contribute towards the overall sustainability of the project. Conducting the assessment highlighted areas that the project needed to be aware of in order to maintain positive change in the Dwesa community.

9.3.2.5.1. Methods and Procedures

The assessment of Sustainability elicited data through the survey questionnaire, interviews, participant observations, and preceding evaluation documentation. All instruments were informed by the aims of the Sustainability theme as outlined in the Outcome and Impact Assessment framework. All instruments aspired to answer the two key components of Sustainability: measures employed to sustain positive outcomes and impacts; and measures to mitigate negative outcomes and impacts observed. Moreover, through the consultation of prior evaluations the researcher identified existing functions and processes of the SLL that resulted in the identified outcomes and impacts.

Survey questionnaire

The survey questionnaire had concluding questions to determine whether there was keen interest to keep the SLL in operation. Furthermore, the survey included questions on whether the current outcomes and impacts were expected to manifest in the near future. The questionnaire aimed at gaining a general picture on the community's view on sustaining the outcomes and impacts they enjoyed. It further aimed to determine whether the community was involved in the functioning of the SLL and their awareness on the plans of the project in the near future. Based on the aims of Sustainability the researcher was able to tailor questions that would elicit the community's view on sustainability of outcomes and impacts. As mentioned in Section 9.3.1.1 the questionnaire instrument for all themes including Sustainability was refined with the aid of the local evaluators employed and the project champion at Ngwane and Nqabara.

Interviews

The aim of the interviews was to have a more in-depth description on the different ways the outcomes and impacts of the SLL were being sustained. The interview further provided an

opportunity for participants to share their views on the importance of Sustainability in the SLL. All the interview questions were aimed at identifying the different variables that made up Sustainability. Therefore, the researcher planned to focus on identifying existing measures in place for sustaining outcomes and impacts and also future measures that could be employed to sustain project effects. Moreover, the researcher planned to identify the ways in which the project stakeholders anticipate to mitigate any negative effects that were identified. Based on the outcomes and impacts identified throughout the interview process, documentation, observations and survey of all other themes the researcher was able to contextualise the interview questions for Sustainability more appropriately.

Documentation

The researcher planned to review project documentation as part of the comprehensive approach being followed in this study. Prior evaluations and documentation on the project background assisted the researcher in understanding the operations of the SLL with a focus on the aspects of the project that resulted in outcomes and impacts. The researcher was then able to investigate (through interviews and observations) how those particular aspects were being maintained for the long term. Like all other themes the researcher had access to project documentation which was freely available from the project leader and the SLL website.

9.3.2.5.2. Data Collection

Survey questionnaires

For the assessment of Sustainability the survey comprised of open-ended questions as there were no identified pre-defined measures that the researcher was aware of for sustaining outcomes and impacts. Therefore, the researcher desired the community's descriptive opinion on sustaining project outcomes and impacts. Open-ended responses provided data on how the project team shared ownership of the project with the community. Most community members indicated that they were not aware of the future of the project and were not involved in much of the project planning. Therefore, they were not aware of how outcomes and impacts were being (as-is) sustained. As a result, it was found that it would be best to interview the project champions and project team who were actively involved in the project to determine the *existing* measures put in place. Community members did however have minor suggestions for how outcomes and impacts could be sustained.

Interviews and Participant observations

Project champions, teachers, select community members (through referrals from project champions), and the project team were interviewed on their views on sustaining the positive outcome and impacts that were being experienced. Project champions provided some ideas on ways the current outcomes and impacts were being sustained. They highlighted that the community was not actively involved in the management of the project and therefore, could not provide elaborate details on how the identified outcomes and impacts were being (existing measures) sustained. The researcher noted that this could possibly be due to the management of the programme leaning towards a top-down structure. Therefore, major project decisions, such as measures being put in place to try to maintain project outputs etc. resonated mainly from top management. Project champions, however, did suggest minor changes for the project, which could possibly contribute to sustaining outcomes and impacts, particularly the computer literacy training and maintenance of lab equipment. Moreover, the researcher observed how, overall, the project was operating and observed the project activities (such as the availability of the Internet services) in place that resulted in outcomes and impacts. That way the researcher was in a position to engage in conversations about these project activities with stakeholders.

Documentation

The researcher reviewed prior evaluation reports, specifically the Process Assessment. The SLL Process Assessment discussed project practices that promoted sustainable use in the SLL. These sustainable use factors augmented the discussion on the different activities and services that lead to outcomes and impacts. Such information, paved way for the researcher to approach the project champions and project team (both groups being the most active in the project) with context specific questions of sustaining outcomes and impacts. General community members could only make suggestions on how outcomes and impacts could possibly be sustained in the future. They did not provide much details on existing measures at the time of the outcome and impact assessment.

9.3.2.5.3. Data analysis

Open ended responses from the survey and interview data were thematically analysed for ways in which positive outcomes and impacts were being sustained. The researcher reviewed all the data in order to understand how the data related to Sustainability and have a qualitative description on the ways in which outcomes and impacts were sustained. The researcher was also able to corroborate the data from interviews with the observations made over the two years. As some of the outcomes and impacts identified were not expected by the project team, explicit measures for their sustainability were not identified.

9.3.2.5.4. Lessons learned

The assessment of Sustainability should be a continuous process that continues even after the Outcome and Impact Assessment is complete: Not all outcomes and impacts that are identified are intended by the project team. As a result, the project might not have any measures in place to ensure unintended positive effects are sustained and negative effects are dealt with. Through the outcomes and impacts identified, it would be best to present this information to the project team and continue to elicit their views on ways to ensure that positive outcomes and impacts are sustained. As outlined by Patton (1997), the evaluation process does not end with the assessment report; however, post evaluation engagement to reflect on findings with stakeholders should be encouraged.

9.3.3. Summary of data collection instruments

Table 9.1 outlines the data collection instruments used in the research according to each theme. Moreover, Table 9.2 provides a summary of the challenges faced when implementing the data collection instruments.

Table 9. 1: Summary of SLL data collection instruments

Outcome/Impact Theme	Data Collection Instrument
Strategic Value	Documentation
	Participant Observations
	Interviews
	Survey
Most Significant Change	Story-telling
	Interviews
	Focus group *(planned but did not occur)*
Empowerment	Documentation
	Participant Observations
	Interviews
	Survey
Livelihoods	Documentation
	Participant Observations
	Interviews
	Survey
Sustainability	Documentation
	Participant Observations
	Interviews
	Survey

Table 9. 2: Challenges of data collection instruments-SLL

Data Collection Instrument	Challenge Experienced
Documentation	The researcher had fears that some of the data from prior project documentation and assessments would no longer be applicable, given

	the time difference that lapsed between different research initiatives within the SLL. However, having conducted various observations during field trips and becoming familiar with the context it became apparent that data from prior research within the SLL was still applicable and useful to this study.
Participant Observation	The researcher found observations to be the easiest instrument for the data collection. However, the researcher experienced a challenge separating the data collected actual project effects with data on how the instrument itself was working. The researcher found that by clearly noting the different themes to observe for and also being open to allowing the data to speak for itself, it reminded the research to be aware of not only the actual effects of the project but also being aware of the instrument itself.
Interviews	A key challenge experienced was when interviewees would shy away from giving holistic details on their views of the SLL. Some felt that since the interviews were being recorded they may provide data that would get them into trouble with the project team. The researcher had to ensure anonymity of personally identifiable information and also encourage interviewees that information provided will aid in improving the project and address some of the concerns they may have with the project.
Survey	An initial challenge was the language barrier given that the community members were dominantly isiXhosa speakers. Moreover, the researcher had fears that meaning will be lost when translating the questionnaires from English to isiXhosa and the responses from isiXhosa back to English. However, the local evaluators who assisted with the data collection where competent in both English and isiXhosa. They were given training on how to assist community members with completing questionnaires and were encouraged to keep a journal of the entire process which aided in ensuring that data collected did not lose its meaning due to language barriers.
Story-telling	The story-telling instrument was conducted with school learners; however, as the principals/project champions were the ones who selected the learners who would partake there was some bias experienced in the selection process. The researcher found that the learners selected were mainly the top performers as principals and project champions felt that they needed to select learners who would uphold a good image for the school, which will be reflected in their style of writing. As a result, the researcher then had to change her approach when she moved on to conduct the study in the second case study (the ICT4RED) to avoid the misconception that only top students or those who write well can participate in the study.

9.3.4. Summary of Lessons Learned from the Assessment of Outcomes and Impacts: SLL

Table 9. 3: Summary of Lessons Learned – SLL

Theme	Lessons Learned
Application of Evaluation Guidelines	Engaging with stakeholders aided with finalising the data collection instruments
	Engaging with stakeholders gave the researcher the opportunity to grasp the project
	Project recipients, particularly project champions, are key informants for planning an evaluation
	Collaborating with stakeholders creates an opportunity for empowerment evaluation to take place
	Preceding evaluation data is relevant for contextualising the outcome and impact assessment framework
Strategic Value	Participant observations provide a relaxed environment to engage with community members and elicit their opinions about the services being offered by a project
	The Strategic Value of a project should be clear and clearly communicated to community members
	An Outcome and Impact assessment informs other domains of evaluation
Most Significant Change	The assessment of Most Significant Change should be a method incorporated within the assessment of Strategic Value, Empowerment and Livelihoods
	The assessment of Most Significant Change creates an environment for unintended outcomes/impacts to emerge
Empowerment	For the assessment of Empowerment, community members should be encouraged to complete surveys based on their own experiences
	Survey questionnaires should be phrased in such a manner that community members own the questions being asked
	Outcomes and impacts should not be presented in isolation from each other
Livelihoods	The alignment between project outputs and community goals is important for understanding the types of Livelihood outcomes and impacts experienced by community members
Sustainability	The assessment of Sustainability should be a continuous process that continues even after the outcome and impact assessment is complete
	Low engagement of project recipients, such as project champions, in the management of the project influences their engagement in the sustainability of project outcomes and impacts

9.4. CASE STUDY 2: ICT4RED

The Information and Communication Technologies for Rural Education Development (ICT4RED) in Cofimvaba, is an e-textbook initiative implemented by the Council for Scientific and Industrial Research (CSIR) Meraka institute. The project, which is situated in Cofimvaba, in the Eastern Cape province of South Africa, has been in operation since August 2012. The project forms part of a broader initiative by the Department of Science and Technology titled TECH4RED (Technology for Rural Education), which addresses various school needs beyond teaching and learning, such as water and sanitation, and nutrition.

The ICT4RED project aims to influence positive change in the teaching and learning environment and the development of 21st-century skills among teachers and learners (Herselman and Botha, 2014). The project aims to support teaching and learning through ICTs towards a 21st-century schooling environment in the Cofimvaba school district in South Africa. The project provides tablets to teachers, district officials and learners. The project further provides Teacher Professional Development (TPD) training on various teaching strategies (ICT4RED, 2014; Herselman and Botha, 2015). Through the TPD, the project aims to equip teachers with the skills (building knowledge, increasing collaboration, using ICTs for communication and learning, solving real problems in an innovative manner and self-regulation), knowledge and strategies to enable 21st-century teaching and learning engagement for the information age (Herselman and Botha, 2015). Therefore, improving teaching and learning involves changing classroom practice from a teacher centred design to a learner centred design. Through this, the anticipated intermediate project impacts include a change in classroom practices that portray learner involvement, and practices that are collaborative, creative, integrative, active and evaluative. While the final anticipated impacts include improved learner results and their employability in the future; and the development of 21st-century skills, which include problem solving, communication, collaboration, creativity, confidence in ICTs, and critical thinking. The project also aims to develop a model for the roll out of electronic textbooks to rural schools in South Africa.

9.4.1. Background to Cofimvaba

Cofimvaba, established in 1877, is a town located in the Eastern Cape Province of South Africa. Each province in South Africa is divided into Districts, and each District is divided into circuits with District offices that manage the schools within a circuit. It falls under the Instika Yethu local municipality in the Chris Hani District (see Figure 9.5) and has an average population of

35500 (StatsSA, 2011). Cofimvaba is characterised by mountainous terrain and sparsely distributed villages with limited tarred roads. Poverty and unemployment are highly ranked in the area. The main language spoken in the area is isiXhosa. Education in the area continues to be plagued by various problems, such as, limited access to textbooks, poor infrastructure in place, and limited water and electricity. There are 11 school circuits in the area. The Nciba circuit of the Cofimvaba school district, where the ICT4RED project was initiated, comprised of three Primary Schools, one Secondary School, 13 Junior Secondary Schools, seven Senior Primary and two Senior Secondary Schools. In total 26 schools from the Nciba circuit took part in the ICT4RED initiative by 2015 (Herselman and Botha, 2014).



Figure 9. 5: District Municipalities in South Africa

(Adapted from Herselman and Botha, 2014: 7)

9.4.2. ICT4RED Background

The initial aim of ICT4RED project, as envisioned by the South African government, was to supply electronic textbooks through the use of tablets to resolve the shortage supply of paper based textbooks to schools in South Africa (Herselman and Botha, 2014). ICT4RED project aims to explore the use of mobile technology to support teaching and learning to improve 21st-century teaching and learning skills within the circuit. The project provided tablets to teachers, learners and district officials. The scope of the project is to provide tablets to teachers, learners, and district officials at 26 Nciba circuit schools and improve the educational performance of learners. As part of the project development, the project was piloted at one school, Arthur Mfebe SSS, which then expanded to more schools, through three phases, in the Nciba circuit in the Cofimvaba school district. The schools that were engaged in the project include:

Phase 1:

- Arthur Mfebe Senior Secondary School (2012)

Phase 2:

- Bangilizwe Junior Secondary School (2013)
- Gando Junior Secondary School (2013)
- Gudwana Junior Secondary School (2013)
- Khwaza Senior Secondary School (2013)
- Mgcawezulu Junior Secondary School (2013)
- Mtimbini Senior Primary School (2013)
- Mvuzo Junior Secondary School (2013)
- Ntshingeni Junior Secondary School (2013)
- Siyabalala Senior Secondary School (2013)
- St Marks Junior Secondary School (2013)
- Zamuxolo Junior Secondary School (2013)

Phase 3:

- Cube Senior Primary School (2014)
- Gqoboza Junior Secondary School(2014)
- Intlangano Senior Primary School (2014)
- Jongulwandle Junior Primary School (2014)
- Mbudlu Junior Secondary School (2014)
- Mpomvane Senior Primary School (2014)

- Sentile Junior Secondary School (2014)
- Sidubi Poort Junior Secondary School (2014)
- Thembisile Martin Hani Junior Secondary School (2014)
- Vukani Junior Primary School (2014)
- Zanendyebo Senior Primary School (2014)
- Zenzile Junior Secondary School (2014)
- Zigudu Junior Secondary School (2014)
- Zwelibangile Junior Secondary School (2014).

Figure 9.6 outlines the model (Ford, Botha and Herselman, 2014) used to drive the project for 21st-century schooling to take place. The model outlines the various components the project team required to implement such an initiative. Each component has a designated manager that oversees that functioning of that component. The final model comprises of 12 components (Figure 9.6):

- Project Management
- Change Management
- Operations Management
- Evidence-based policy
- School ICT infrastructure
- Teacher Development
- Communication
- Community Engagement
- Network
- Content
- Monitoring and Evaluation
- Stakeholder Management

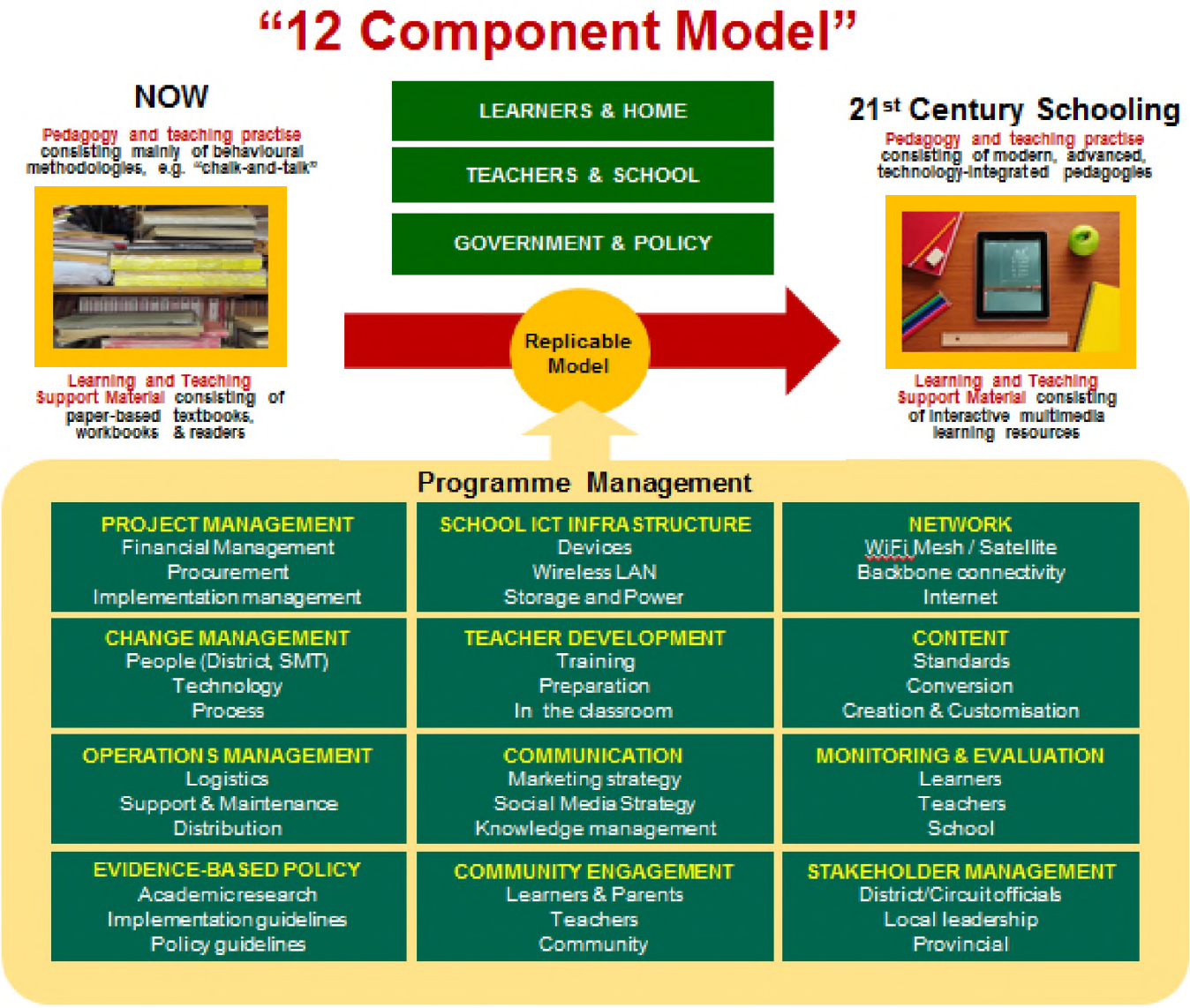


Figure 9. 6: ICT4RED 12 Component Model

(Herselman and Botha, 2014: 48)

The Council for Scientific and Industrial Research (CSIR) Meraka Institute in South Africa had overall project management responsibility of the project, which they handed over to the Department of Basic Education and the Eastern Cape Department of Education in mid-2015. The project is funded by the Department of Science and Technology (DST) and the Department of Rural Development and Land Reform with the support of the Department of Basic Education and Eastern Cape Department of Education. Beyond the need to improve teaching and learning in the 26 Nciba schools, ICT4RED project is also a research endeavour to develop models for the roll-out of mobile technology in resource-constrained environments in a rural context

(Herselman and Botha, 2014). The ICT4RED is part of the Technology for Rural Education Development (TECH4RED) initiative, which aims to improve rural education through innovation using technology (Herselman and Botha, 2014). Part of the TECH4RED entails various interventions, including eHealth, nutrition, water and sanitation, energy, teacher and learner support, and the ICT4RED project.

9.4.3. ICT4RED Teacher Professional Development

A key service provided by the project is the Teacher Professional Development course offered to teachers. Teachers are taken through 10 modules of 21st-century teaching strategies, while incorporating the use of tablets. Figure 9.7 (Botha and Verster, 2014: 4) outlines the 10 modules provided to teachers and district officials. As part of the TPD training, teachers earn badges and upon successful completion of all modules, target recipients can then own their tablets. This forms part of the "Earn as You Learn" initiative implemented by the project to ensure that technology is not given for free, but rather earned to promote ownership and use of the technology. The Teacher Professional Development is the key component of the project and all project activities were designed to centre on the TPD. The project decided that a key element for integrating technology in schools is the engagement of teachers. Therefore, enhancing teaching strategies was important for the success of 21st-century teaching with or without technology.

An organisation called SchoolNet SA had the responsibility of facilitating the TPD training and assessing teachers during their badge collection (Herselman and Botha, 2014). SchoolNetSA was identified as the largest teacher training non-profit organisation in South Africa and was a suitable choice to facilitate the TPD training (Herselman and Botha, 2014). The ICT4RED project outlined the Programme Theory of Action and Theory of Change (Table 9.4) for the TPD training. The Theory of Change and Theory of Action outlines the anticipated chain of events required for 21st-century teaching and learning to take place in the Cofimvaba school district.

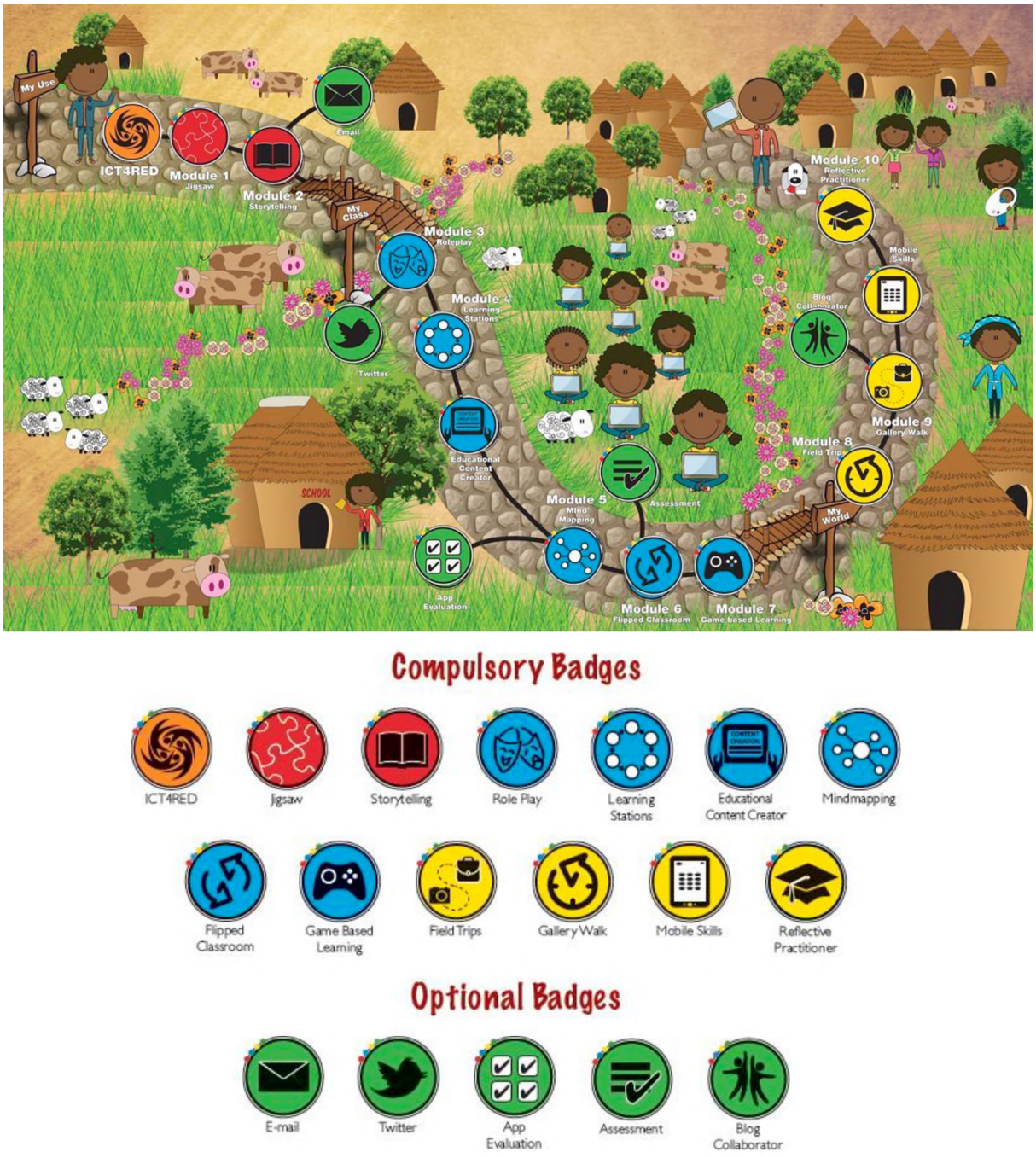


Figure 9. 7: ICT4RED TPD Modules

Table 9. 4: TPD Theory of Action and Theory of Change

(Herselman and Botha, 2015)

If teachers, • who work in primary, combined and secondary schools with functionality constraints typical of rural quintile one, two and three schools • who also have had limited exposure to tablet and computer Technology and • who also have had limited training on incorporating technology into teaching and learning	*Context*	
voluntary participate in the ICT4RED project which requires: • that all participating teachers and managers complete the 10 module SACE[1] Accredited ICT4RED Teacher Professional Development course and all assessment requirements (i.e. achieve at minimum the minimum number of badges • that a small group of ICT teachers are trained as an ICT Committee at schools able to set appropriate policies and procedures for the use of technology in place • that all teachers and managers get access with the view of ownership to appropriate technology • with relevant software and content preloaded and additional peripherals when they have achieved a minimum competency level • that schools get access to a pool of shared tablet computers with relevant software and content and peripherals when they have demonstrated a minimum level of competence • *and if* typical first order barriers (extrinsic to teachers) to the integration of technology in regular classroom practice is mitigated through providing ○ access to stable electricity ○ secure storage for the School shared technology ○ a support person besides the teacher to help with managing the technology for use in the class, ○ easy access to appropriate, updated and free learning and teaching resources not necessarily dependent on the internet, ○ technical support to deal quickly and efficiently with technology problems, ○ a process to develop support from School and the District *f*or the incorporation of technology into teaching and learning in the classroom	*Theory of Action*	• *and if* typical second order barriers (intrinsic to teachers) to the integration of technology in classroom practice is mitigated through providing ○ TPD as a structured and scaffolded process ○ pragmatic knowledge and skills relevant to the integration of technology into classroom practice that complements the prescribed curriculum ○ game based (principals of gamification) experiential learning (simulated learning experiences) as part of the TPD ○ teachers with technical support through available and accessible means TPD ○ teachers with the opportunities to become co-creators and reflective practitioners in the TPD ○ regular formative feedback Then the following **intermediate outcomes** will emerge: • teachers react positively to the intervention • classroom practice will reflect more of "emerging pedagogy for the information age" • teachers demonstrate proficiency in implementing 10 learner centered teaching strategies that would successfully outline the integration of technology into a 21st Century learning environment. • teachers demonstrate proficiency in Technology skills related to an Android Tablet and its use to support the teaching and 21st Century learning engagement • teachers acquire knowledge related towards being, participating, teaching and learning in a digital world. • teachers feel comfortable integrate technology into their classroom practice • teachers demonstrate confidence to experiment with the use of software and hardware in their teaching practice • teachers demonstrate proficiency in guiding and assisting learners to use technology to learn. • schools become supportive of ICT enabled teaching and learning Which are required for the following **longer term** outcomes to emerge: • classroom practice will tend to portray more "emerging pedagogy for the information age" • teachers regularly incorporate the use of appropriate technology enabled 21st century teaching into their day to day teaching • teachers effectively manage interference from ICT in teaching and learning • schools continue to manage ICT use and devices effectively and if these longer term outcomes emerge, then the following **longer term** impacts may emerge: • Teachers's 21st Century teaching skills improve. • Learners respond to or are positively affected by 21st century teaching, • Learners' 21st Century skills would improve. • Schools' effective use and management of ICT-based interventions improve.	*Theory of Change*

9.4.4. ICT4RED Outcome and Impact Assessment Evaluation Plan

The overall Outcome and Impact evaluation plan was similar to that of the SLL. The ICT4RED project lead researcher, subject advisors, project champions, teachers, and learners at Arthur Mfebe SSS were informed of the outcome and impact assessment research, its purpose and its implementation within the ICT4RED. The researcher, with input from the project champion at Arthur Mfebe SSS, and the lead project researcher, performed the overall planning for the Outcome and Impact assessment.

To ensure effectiveness in the application of the outcome and impact assessment, all evaluation guidelines stipulated within the proposed framework were applied, see Section 9.5.1. The planning phase of the evaluation entailed presenting the purpose of the evaluation and the individual themes involved.

9.4.4.1. Outcome and Impact assessment process.

As discussed earlier, the Outcome and Impact assessment process comprises two stages. It stems from the Rural ICT Comprehensive Evaluation Framework (RICT-CEF), which encompasses this current study. For the assessment of the ICT4RED project only stage one took place. The project has been operating for a short period and therefore, there were no impacts identified at the time of the assessment. As a result, the researcher only identified outcomes as outlined in the ICT4RED project assessment report, Appendix G. Figure 9.8 demonstrates stage one of the Outcome and Impact assessment process followed.

1. *Engage with local and external stakeholders*: The evaluation followed a collaborative evaluation, which included the project champion at Arthur Mfebe and the lead project researcher; see Section 9.5.1.1.
2. *Identify outcomes/impacts to measure*: The outcomes identified for the assessment were based on the key Outcome and Impact themes specified in the proposed Outcome and Impact assessment framework. Themes were contextualised to suit the ICT4RED project context based on project documentation, such as project implementation reports, and information from stakeholders (Section 9.5.2).
3. *Plan the outcome/impact assessment*: The researcher engaged with the project champion, and the lead researcher on the project to plan the assessment (Section 9.5.1).
4. *Gather credible* evidence: The researcher collected data from research participants. Data was collected through the use of interviews, participant observations, prior project documentation, and narratives (see Section 9.4.4.3 and 9.5.2).

5. Interpret data regarding outcome and impact evaluation questions: Outcome data was interpreted through various approaches. Outcome data was interpreted in the context of project initiation, implementation and prior evaluation documentation (refer to Appendix G)
6. Disseminate outcome/impact data: An Outcome and Impact assessment report for the ICT4RED project has been developed (Appendix G). The report will be distributed to internal and external stakeholders. Moreover, findings from the outcome and impact assessment of the ICT4RED project will form part of future research publications to inform a wider research audience.

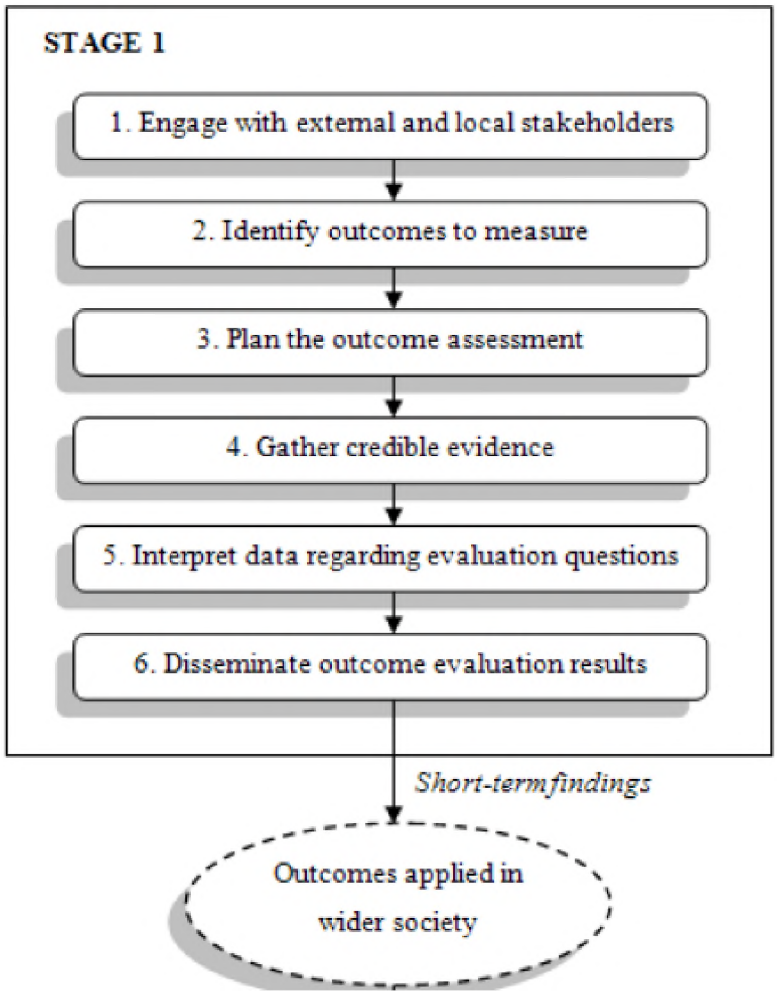


Figure 9. 8: Stage 1 of the Outcome and Impact assessment process

9.4.4.2. Evaluation Questions

Four assessment themes were identified as key to evaluating the outcomes of the ICT4RED project. These themes included Strategic Value, Empowerment, Livelihoods and Sustainability. Most Significant Change had rather been identified as an essential method for

data collection across all key themes (based on the evaluation of the other case study). The research questions that guided the Outcome and Impact Assessment were as follows:

1. Strategic Value
   - 1.3 What strategic value is the ICT4RED project adding within the Cofimvaba district and specifically to Arthur Mfebe Senior Secondary School (SSS)?
   - 1.4 Are project outputs equipping project recipients to achieve improved teaching and learning?
2. Most Significant Change
   - 2.3 What has been the most significant change that has occurred at Arthur Mfebe SSS and the community?
   - 2.4 What would project recipients like to see differently as a result of the ICT4RED project?
3. Empowerment
   - 3.5 Have teachers and learner's informational, human, and social capabilities been expanded?
   - 3.6 Have the teachers and learner's assets (psychological, informational, organisational, material, financial) been enhanced as a result of the ICT4RED project?
   - 3.7 Has the teachers and learner's pool of choices been expanded as a result of the ICT4RED project?
   - 3.8 Have the teachers and learners utilised the choices available as a result of the ICT4RED project and have desired results been achieved?
4. Livelihoods
   - 4.4 What livelihood objectives were anticipated to be met as a result of the project? And have they been met and how?
   - 4.5 Has the project aided in enhancing the project recipients' capitals?
   - 4.6 Has the project affected the project recipients' livelihood strategies (ways of making a living)?
5. Sustainability
   - 5.3 What measures have been put in place to ensure the positive outcomes and impacts are sustainable?
   - 5.4 What measures have been put in place to mitigate the negative outcomes and impacts that have been observed?

9.4.4.3. The Methods and Procedures

For purposes of the assessment, four main methods were used to elicit data, refer to Appendix H. Much like with the SLL, all methods were used to assess all the themes simultaneously:

- **Interviews**
  - Interviews were held with six teachers, two district officials, one subject advisor, one technical assistant and two ICT champions. These participants could detail the significant changes they had observed since the inception of the ICT4RED project. Interviews also aided in eliciting information on whether teachers and learners' capabilities were enhanced, and how ICTs affected their way of teaching and learning.
  - Interviews with the ICT champions and teachers provided in-depth detail as to how the ICT4RED project was equipping Arthur Mfebe SSS to achieve improved teaching and learning.
  - Interviews with the district officials, subject advisors and teachers aided with identifying the measures put in place to ensure sustainability of the project's outcomes and impacts.
  - Interview participants were identified through a snowball sampling method. The lead ICT4RED project researcher identified key project informants (such as the project champion at Arthur Mfebe, a subject advisor, the technical assistant, two teachers and one District official) that would provide in depth details on the project. These informants were also in a position to recommend other project stakeholders that could engage in in depth discussions about the project effects. Moreover, Arthur Mfebe comprised of thirteen teachers, from which only eight were actively involved in the ICT4RED initiative. Only six teachers from the eight where available to partake in the interviews during the data collection period. Despite the limited number of teacher interviewed the in-depth descriptions provided valuable insight into the project effects.
- **Narratives**
  - Written storytelling narratives from the high school children who have been participating in the ICT4RED project provided rich detail on the changes brought about by the ICT4RED project.
  - The learners were requested to provide their views on the most significant change that they have observed at Arthur Mfebe SSS and in the community. They also provided recommendations on the changes they would like to see in the ICT4RED project.

- The project champion at Arthur Mfebe selected seven learners from the final year school learners. These learners where selected on the basis that they were present at the school when the project was introduced and they have been engaging with the tablet technology that was implemented. Therefore, they are able to reflect on any changes that they have observed since the inception of the project.

- **Participant Observations**
  - The TPD training offered an opportunity for the researcher to engage with several of the District Officials and Subject Advisor. During training the researcher also completed the training tasks and took part in the various group assignments that were conducted. The researcher, however, had limited time to take part in the Teacher Professional Development (TPD) training of district officials in Queenstown. Moreover, the researcher had the opportunity to observe some of the lessons, particularly the Mathematics and Agriculture lessons, at Arthur Mfebe SSS. Although the observations were conducted over a short period of time, the researcher gained some useful insight on how teaching strategies were influenced by the ICT4RD project.
  - The researcher took field notes on how the ICT4RED project operated on the ground and the views and opinions of teachers and district officials as they took part in their training. The researcher also had the opportunity to observe the Grade 12 Maths class and the Agriculture Management Practice lessons at Arthur Mfebe SSS.
- **Documentation**
  - Documentation of the ICT4RED project initiation, and implementation aided in providing background details of the various outputs the project produces to position Arthur Mfebe SSS to achieve enhanced teaching and learning.

9.5. REFLECTIONS ON THE OUTCOME AND IMPACT ASSESSMENT OF THE ICT4RED

The researcher reflected on: how the Evaluation Guidelines were applied; the role Preceding ICT4RED project Evaluations played in the overall assessment process; and how the Outcome and Impact themes were applied. The following discussion is structured according to the Outcome and Impact Assessment framework arrangement.

The Outcome and Impact assessment process took place over four research trips during a period of May 2014 to March 2015. The assessment process was initiated through an introductory trip

to the research site in Cofimvaba in May 2014. The aim of the trip was to familiarise with the project environment and meet some of the project stakeholders. The researcher met with:

- the project CEO,
- chief researcher on the project,
- the Stakeholder Manager,
- a SchoolNet facilitator,
- the Project Manager,
- the Content Manager,
- the key District Officials who had been hands-on in the project in charge of ICTs in the circuit,
- one of the technical assistants, and
- several school teachers, learners, parents and principals during the various school visits.

During this trip, the researcher engaged with the various stakeholders to gain some understanding on the background of the project, the various project activities and services provided such as the TPD training, and how the project worked as a whole. The researcher also familiarised herself with the staff at Arthur Mfebe, were primary data collection was going to take place. She spoke to the relevant stakeholders to introduce her research and the type of work that she would be conducting at the school and within the area in the consecutive months. During consecutive trips, the researcher was involved in continuous data collection through interviews, review of project documentation and observations at Arthur Mfebe and training centres. During the Outcome and Impact assessment period the researcher aimed to identify the ways in which the ICT4RED project had impacted teaching and learning at Arthur Mfebe in particular. Arthur Mfebe was the pilot school for the project and therefore, the project had been involved at Arthur Mfebe for the longest period. The researcher focused on the key Outcome and Impact themes – Strategic Value, Most Significant Change, Empowerment, Livelihoods and Sustainability – as guiding themes for the assessment.

All the findings from the assessment were presented in an Outcome and Impact Assessment report (refer to Appendix G for a complete Outcome and Impact assessment report of the ICT4RED project). The report describes the effects of the project on teachers, learners and their 21st-century teaching and learning skills at Arthur Mfebe. It was found that for the Outcome and Impact assessment there were no long-term impacts, as the project had been in operation

for only 2 years at the time of the assessment, which is not sufficient for long term impact to be observed. The report covers the following topics:

(a) Needs of the target recipients

(b) Outcome and Impact methodology

(c) Outcome and Impact assessment findings according to the themes: *Strategic Value, Empowerment, Livelihoods* and *Sustainability*. (The findings for *Most Significant Change* were incorporated with the *Strategic Value* and *Empowerment* discussions.)

9.5.1 Application of Evaluation Guidelines

The Evaluation Guidelines, as outlined in the Outcome and Impact Assessment framework, provided guiding principles for the researcher to follow and implement within a real life case study. The following guidelines were taken into account:

- *Stakeholder relationship* – The researcher interacted with various stakeholders to ensure that the assessment process was not conducted in complete isolation and that various views were heard to create a more complete picture of the project outcomes and impacts.
- *External environment* – The context in which the project operates needed to be understood and how it affects the findings. Such information was important for the researcher to orient herself with the project and also understand some of the project findings. For example, understanding the relationship structure/hierarchy of the education system aided the researcher in understanding the various expectations of the different stakeholders and project recipients in order to contextualise the framework more appropriately.
- *Preceding Domains of evaluation* – Given that a key aspect of the Outcome and Impact assessment framework is the ability to refer to preceding project evaluation, which inform the assessment process and also enrich the findings, the researcher had access to project documentation that referred to some prior evaluation information.
- *Ethical considerations* – Ethics were an important aspect to consider aiding the researcher in conducting the study in a manner that was deemed appropriate by project stakeholders and also aiding in their collaboration in the assessment process.

9.5.1.1. Stakeholder Relationship

The evaluation followed a collaborative evaluation, which included various project stakeholders, namely the lead researcher from the ICT4RED project team and one of the ICT champions at Arthur Mfebe. The early stages of the evaluation involved making important decisions, which required the presence of different stakeholders. Therefore, a collaborative

approach to the evaluation process was appropriate. Involving stakeholders continuously aided with contextualising interview questions appropriately, gaining input from stakeholders and ideas for data collection, and aided with overall understanding of the project. The initial stage of the evaluation process involved introductory meetings with various internal and external stakeholders. The principal researcher for the ICT4RED project introduced the researcher to the different project team members (the project CEO, the Stakeholder Manager, two SchoolNet facilitators, the Project Manager, the Content Manager, the key District Officials who had been hands on in the project in charge of ICTs in the circuit, and one of the technical assistants) and some of the staff members at Arthur Mfebe. Through this process, the researcher had an opportunity to introduce her research and intentions. The researcher also had an opportunity to discuss the preferred means of communication with the different stakeholders and set subsequent site visits to the school. Teachers and the ICT4RED project principal researcher also outlined their expectations from the research and indicated the appropriate channels to approach for a successful assessment process to take place. The principal researcher for the ICT4RED project provided advice on: when it was appropriate to conduct site visits; who to speak to, to make the appropriate arrangements before conducting any formal assessment. She also provided some background on the different roles on the project, some of the challenges they have experienced conducting research on the project, and general project information, such as, the various activities that the project recipients engage in.

The subsequent phases of the evaluation process involved working closely with one of the ICT project champions at Arthur Mfebe. The ICT champion assisted the researcher with arranging interview meetings with the teachers at the school. She assisted with organising the learners who were involved in the assessment process. She was able to provide advice on ways to conduct the assessment and provided suggestions on aspects to consider the project a success or a failure. For example, she indicated that the best way to monitor the project and see if the project has been successful is to identify whether integration of technology is indeed taking place at the school. She further suggested that an appropriate way to identify whether full integration was indeed taking place was to immerse oneself in the training that was being offered and see on the ground how teachers interact with the technology.

Overall the opportunity to work closely with the ICT champion and the principal researcher made the assessment of the ICT4RED project possible. They provided guidance and paved way to create contacts with various teachers, subject advisors, learners and district officials who were able and willing to assist with the assessment process. Moreover, through collaborating

with stakeholders they also gained from the assessment process rather than being mere sources of information. For example, one teacher indicated that he was also learning from the interview process on ways they could improve the project given that he is a member of the ICT committee at Arthur Mfebe. This was based on the various questions on Strategic Value and Empowerment that were being asked during the interview. Based on the questions asked, the interviewee recognised that they too as project recipients had a role to play in the development process. For example, being more active in the planning and management of the project (taking on a collaborative approach), rather than always accepting what the project initiators decide.

9.5.1.2. Application of Comprehensive Evaluation: Reference to Preceding Domains of Evaluation

The ICT4RED project has prior evaluations conducted throughout the project lifecycle to assess how it had been performing with the aim of learning and improving the project. As the project is partly a research endeavour to field test various models to improve educational performance it was important to have regular monitoring and evaluation in order to learn from and improve the project. The researcher had access to most of the project documentation related to the initiation, implementation and some of the outcomes that had been experienced from the project.

According to the project documentation that was available, the preceding evaluations conducted within the ICT4RED project were not specifically tailored to particular domains. For example, the evaluations were not explicit and categorised as Baseline evaluation, Needs Assessment, Programme Theory Assessment, Process Assessment and so forth. The evaluations conducted were a continuous learning process on what was done in the project, what the project team learned and what resultant changes were implemented in subsequent phases of the project. However, the researcher was able take some of this evaluation documentation and draw out aspects that related to Baseline data, Needs data, Programme Theory data and Process data.

- **Project background data:** Documentation on the project background provided baseline data on the context in which the project is operating such as background to Cofimvaba and the schools in the area. Documentation also provided background information on the aims of the ICT4RED project, the needs that were being met by the project, and how the project was implemented and the various project activities that took place. Such information was relevant to the researcher as it acted as a benchmark on which to conduct the Outcome and

Impact assessment. The data further assisted the researcher with contextualising the Outcome and Impact assessment instruments to suit the ICT4RED project context. The focus of the ICT4RED project is to improve teaching and learning within the circuit. Therefore, the data collection instruments were tailored to suit a teaching and learning context. For example, aspects related to whether the project influenced one's income, which forms part of Livelihoods, was translated to look at whether the project (change in teaching and learning) positively influenced learners' future employability or job creation, which then will affect their sources of income. Project documentation also highlighted findings from a self-evaluation process (the project team conducting its own evaluation of the project) that had taken place. The ICT4RED project monitoring and evaluation team conducted various evaluations of the project, which they termed "self-evaluation". They looked at the relevance, effectiveness, impact and sustainability of the project. Such information was useful in not only gaining a better understanding of the project to conduct a more practical assessment but also provided information that could aid in augmenting the findings from other data collection methods. The self-evaluation information also aided in giving meaning to the outcomes found during the current Outcome and Impact assessment. For example, the type of training offered to teachers, which focused on teaching strategies and incorporated tablets to aid the teaching strategies, was found to be relevant to the objectives of the South African government to improve education – education focused rather than technology focused. This information aided the researcher in understanding that from the TPD training provided, there were teachers who still had difficulties using tablets as they only knew how to use them during the training but were not aware on how to contextualise the use of tablets in their own context for their specific subject. Training was limited to general teaching strategies that could be applied to any teaching context/subject. Therefore, once training is complete teachers felt overwhelmed translating the general teaching strategies to strategies that incorporated their specific subject matter and contextualising them appropriately.

Moreover, from the Outcome and Impact assessment findings there have been emerging needs from the project, which will need to be considered for future expansion of the project and future needs assessments that may take place. For example, there was a need to have more continuous *contextualised* training provided.

- **Data related to Programme Theory:** Documentation on the theory of action and theory of change aided the researcher in understanding the design of the project in terms of the 12 Component Model and the modifications and enhancements made to the model to bring

about the objectives of the ICT4RED project. The 12 component model aided in understanding the context of the project and the different elements that make up the project in order to contextualise the Outcome and Impact assessment instruments. The design of the project also aided in understanding the outcomes identified during the assessment. For example, the Theory of Action and Theory of Change (Figure 9.5) for the Teacher Professional Development training outlines the chain of events that had been anticipated to take place in order to attain the desired project results. This chain of events were relevant points of departure for the assessment of outcomes and impacts to determine if indeed this chain of events did occur and how current findings relate to the Theory of Action and Theory of change. Moreover, the findings from the Outcome and Impact assessment can be useful in revising the project Programme Theory (based on what actually took place and the outcomes actually achieved) for future expansion to other circuits in the Cofimvaba District.

- **Data related to Programme Process assessment:** As part of the evaluation design of ICT4RED project by the project team, the project model included an "Implementation Monitoring" component, which monitors whether the various project activities were delivered to the target recipients as planned. This incorporated monitoring project outputs, and use factors, such as, level of use of project resources. Such data relates to an extent to Process assessment information. However, the researcher had limited access to the actual results in terms of Service Utilisation (which is a component for a Process Assessment) of the ICT4RED project services. Such information would have provided the researcher with data on the level of use of service by the target recipients, the perceived usefulness of the services, and the coverage and bias of the project, *etc*. The ways in which services are used and the perceptions of target recipients aids in understanding the types of outcomes and impacts identified. Moreover, findings from the outcome and impact assessment can be beneficial to improving the utilisation of project services and therefore aid with future process assessments that are conducted in a project. For example, from the project documentation a key aspect of the TPD training is the "Earn as you Learn and Badge system". They were implemented to ensure that teachers made use of the technology by earning it rather than being handed the technology for free and also ensuring that each module was implemented in the classroom. From the outcome and impact assessment findings it can be concluded that merely earning the technology is not sufficient to ensure use of that technology. The teachers' perception of the technology and its application to their context does also influence its use, which forms part of the 'Perceived usefulness'

component of the Service Utilisation' theme from the Process Assessment domain of evaluation.

- **Data related to lessons learnt by project team:** The ICT4RED project has documented some of the key results and challenges that were experienced since the project initiation. Much like the other evaluation documentation, the key project results and challenges documented by the project team were relevant to the researcher to become familiar with the project. The results and challenges were also useful in augmenting the findings during the Outcome and Impact assessment. Moreover, the researcher found that some of the results and challenges experienced were also identified during the Outcome and Impact assessment process. For example, the increased collaboration among teachers to share ideas within similar subjects identified from the Outcome and Impact assessment was also part of the key results identified by the project team.

9.5.1.3. External Environment

The external environment, such as the socio-economic context of Cofimvaba and the existing nature and culture of the education system in Cofimvaba, in which the ICT4RED project operates influences the outcomes and impacts that are generated. Therefore, the researcher had to develop some level of understanding of the environment in which the project operated. This understanding aided the researcher to further operationalise the data collection instruments and provide some meaning to the Outcome and Impact assessment findings.

9.5.1.4. Ethical Considerations

As part of ensuring ethical conduct during the assessment process the researcher gained ethical approval from both the University and the project team to conduct the research. Through the different stakeholder relationships, the researcher was able to establish the appropriate ways in which to interact with stakeholders and conduct the research, from the onset of the Outcome and Impact assessment process. The process followed was similar to that of the SLL, whereby all research participants had the opportunity to understand the aims of this research and provide their consent to proceed with the research process. Interactions with the lead researcher on the ICT4RED project and one of the ICT project champions at Arthur Mfebe assisted the researcher with having minimal challenges throughout the assessment. They also advised the researcher on ways to proceed with the assessment that was appropriate for the given context. For example, the appropriate procedure to follow prior to conducting site visits to the school.

9.5.1.5. Challenges encountered from Evaluation Guidelines

The ICT4RED project did not have explicit categories for the prior evaluations conducted. The evaluations conducted were based on project relevance, effectiveness, impact and sustainability. Therefore, the ICT4RED project did not have all the evaluation data required by the various domains of evaluation, such as a full Programme theory evaluation and Process assessment. However, the project did have prior evaluations conducted throughout the various project phases. The prior evaluation findings could be categorised as part of Baseline data, Needs assessment data, Programme Theory assessment data and Process assessment data. It was found that further elaboration on these domains of evaluation will be required to have more in depth data on the project. For example, the project will need to conduct a full Programme Theory assessment and Process assessment. From the Outcome and Impact assessment conducted, the majority of findings related to outcomes (as opposed to impact – which is longer term) and the Process assessment domain of evaluation, such as, service utilisation factors. These findings are not surprising as the project had only been in operation for two years at the time of the assessment, which is limited for long-term impact to occur. Moreover, as the results found were also partly related to the Process assessment domain of the Rural ICT Comprehensive Evaluation Framework, a full-scale Process assessment would be appropriate to identify the factors influencing use of project services and resources. Such information will be relevant for the improvement of services provided by the project and ultimately the uptake of the project by the project recipients, especially when the project is being expanded to more schools in the area. Moreover, the preceding project documentation focused on the design and implementation of the project and therefore, only a high-level summary of the results had been made available to the researcher. There was limited information available on the utilisation of the project services and whether the project design was appropriate for the type of objectives desired. The absence of such information made it difficult to trace the chain of events that resulted in some of the outcomes identified. Furthermore, the researcher had to incorporate service utilisation aspects as part of the data collection process in order to understand the types of outcomes observed and discussed during interviews. As a result, part of the data collection process drew attention away from the core focus of the assessment, which is assessing for outcomes and impacts.

9.5.1.6. Lessons learned from the application of Evaluation Guidelines

Stakeholder relationships are important in facilitating an Outcome and Impact assessment process: Various stakeholders, specifically the project champions and the lead researcher on

the ICT4RED project team played a supportive role throughout the assessment process. They guided the researcher in terms of how to conduct the assessment in a manner that is appropriate for the ICT4RED context. Therefore, local stakeholders have the capacity to advise on the ethical procedures to conduct the evaluation process and should always be consulted for ethical conduct in development related work. Only through building relationships with stakeholders can the values and customs of the community emerge (Krauss, 2009; Mthoko and Pade-Khene, 2013). For example, the first point of contact to make before arranging meetings with teachers or making site visits. Project champions are also able to provide guidance on the various data collection instruments employed and provide their input on the overall assessment process. Such interactions and collaborations are beneficial in ensuring that the assessment process is inclusive of various stakeholders and not conducted in isolation from stakeholders who should benefit from the findings. Moreover, such collaborations aids the success of a project activity (implementation, evaluation, development, etc) (Hosman and Fife, 2008; Huggins and Izushi, 2002; Pade, Mallinson and Sewry 2008; Silvius, Sheombar and Smit, 2009).

Immersion in the project context is important for an outcome and impact assessment: From the outcome and impact assessment the ICT champion at Arthur Mfebe suggested that the best way to identify whether full integration of ICTs in the classroom was occurring was to immerse oneself in the training and different project activities. That way an evaluator has the opportunity to observe, overtime, what is occurring on the ground. Only through pro-longed immersion can one identify the real effects of the project (Batchelor and Norrish, 2005; Wieman, Gast, Hagen and Van der Krogt, 2001). Temporary site visits may give the wrong impression on what is actually happening as during these visits an evaluator has limited time to fully experience and observe project effects.

Engaging stakeholders in the evaluation process creates an environment for the empowerment of stakeholders to occur: Engaging stakeholders in the evaluation process allows stakeholders to also learn from the evaluation process and become more than mere sources of information. During the assessment of the ICT4RED, one teacher saw the interview process as an opportunity to reflect on the way the ICT committee was managing the project and how they could change certain aspects in the project planning to improve the project. In this case, the evaluation process provided the teacher with information and insight that he could use to improve the manner in which the ICT committee was being managed (Henry and Mark, 2003; Diaz-Puento, Montero, and de los Rios Carmenado, 2007). Therefore, project stakeholders can be empowered through the evaluation process.

Access to detailed evaluation findings from prior evaluations is important for the analysis of Outcome and Impact assessment results: Prior evaluation findings were beneficial to the researcher to provide context and meaning to the findings from the Outcome and Impact assessment. Although prior ICT4RED project evaluation results were presented at a high level the researcher could draw conclusions and situate the outcomes found based on prior evaluation results. Therefore, the researcher noted that access to full prior findings can provide a firm foundation to refer to when analysing data. For example, details on the utilisation of the projects services can form a basis on which to understand the type of outcomes identified, such as, the minimal change in teaching strategies at Arthur Mfebe.

Preceding evaluations that have taken place aid in contextualising outcome and impact themes and other evaluation domains: Access to preceding project evaluation data was useful for contextualising the different collection methods. For example, evaluation data on how the project was implemented and data on the aims of the project aided with appropriately contextualising interview questions for the assessment of outcome and impact themes.

9.5.2 Application of Outcomes and Impact Themes

9.5.2.1. Assessing Strategic Value

The assessment of Strategic Value focused on the various activities and services the ICT4RED project provided. The aim was to outline how these services and activities were equipping Arthur Mfebe to achieve the goal of improved 21st-century teaching and learning skills. Strategic Value aimed at determining how teachers and learners at Arthur Mfebe were being positioned in favour of achieving improved teaching and learning at the school and preparing learners for employment. Therefore, the assessment of Strategic Value looked at the alignment between the main service provided by the ICT4RED project – the Teacher Professional Development (TPD) training –and the goal of improved teaching and learning. The project aims to improve teaching and learning by moving away from a traditional teacher centred approach to a more learner centred approach that cultivates a culture of critical thinking, creativity, problem solving, collaboration and ICT integration.

9.5.2.1.1. Methods and Procedures

The researcher utilised qualitative approaches to assess the Strategic Value theme. The researcher incorporated documentation, interviews, and observations to collect data.

Documentation

The researcher planned to review documentation on the background of the project, evaluation information and documentation on the implementation of the project. As part of the comprehensive approach being followed in this study it was important for the researcher to identify the ways in which the project recipients were being equipped to achieve the goals they desired. Project documentation would provide details on the services being provided by the project, the outputs of the project and the aims of the project recipients. The researcher planned to acquire project documentation from the project team, such as the lead researcher on the project.

Interviews

The use of interviews as a data collection method was to gain a rich description of the value the project was adding from the perspective of the project recipients. The definition of Strategic Value informed the construction of the interview questions. Questions were tailored to meet the goals of the Strategic Value theme; which was to determine whether there was alignment between the ICT4RED project services being offered and the goal of improved teaching and learning at Arthur Mfebe. All questions were centred on the project outputs, specifically the TPD training and the use of tablets by teachers and learners in the classroom. The aim was to identify the views of teachers on how they felt the TPD training; new teaching strategies and the use of tablets was equipping them and preparing them to improve their teaching.

Observations

The researcher made arrangements with the lead researcher on the ICT4RED project to attend some of the TPD training sessions and attend some of the handover ceremonies of tablets to schools. Attending training and the handover ceremonies was a good platform for the researcher to familiarise with the project and the various project services and outputs offered. The lead researcher on the project was keen to introduce the researcher to the project team and make arrangements for the researcher to attend some of the training and handover ceremonies. The researcher received a timetable on the different training dates and school site visit dates. From the timetable provided by the ICT4RED project lead researcher, appropriate dates for training were selected. The researcher then informed the ICT4RED project team on the suitable dates selected to attend training and the handover ceremony. During the site visits and the training, the researcher planned to observe the outputs of the project in order to compare with the aims of the project and in accordance with the programme theory.

9.5.2.1.2. Data Collection

The following section outlines that data that was collected for the assessment of Strategic Value.

Documentation data

The researcher reviewed project documentation in accordance to the variables that define Strategic Value. Documentation on the background, initiation and implementation of the project were available in the form of research papers, a book, and blogposts on the ICT4RED project. The documents accessed provided an overview on the various activities that were deemed necessary to implement such an initiative in a resource constrained environment. Moreover, the documents also outlined how the various project activities were managed and implemented as part of the overall ICT4RED project implementation framework. These documents were readily available to the researcher to access and gain insight on the project, its services and the various outputs it has produced over the three years it has been in operation. These services and outputs were important for assessing the extent to which they were beneficial to teachers and learners. The data was beneficial to the researcher to develop some context on the project and the manner in which it has been aiding the schools in Cofimvaba, specifically Arthur Mfebe in achieving improved teaching and learning at the school. The ICT4RED project TPD Programme Theory of Action and Theory of Change (Table 9.2) provided insight on the various action steps outlined by the project to achieve the goal of improved teaching and learning and the development of 21st-century teaching and learning skills at the school. Moreover, the researcher was able to formulate and contextualise appropriate interview questions with regards to whether teachers felt that they were being equipped to achieve improved teaching at Arthur Mfebe. Documentation on the project background also aided the researcher in identifying the different project services, such as the TPD, to engage in during the participant observations.

Interview data and Observation data

Data from the interviews and observations comprised mainly of information on the type of training teachers and district officials received. The researcher assisted with some of the training and engaged with the facilitators, teachers and district officials and was exposed to the various modules people were trained on. For the observations, the researcher had the opportunity to take part in two of the TPD training sessions offered to teachers and district officials. Through this training, the researcher was able to gain first-hand experience on the type of training offered and also engage in casual conversation with facilitators, district

officials, the project team, and teachers. Moreover, the researcher attended one hand over ceremony of tablets to three schools in the area. Through these observations the researcher had the opportunity to observe how teachers, learners and district officials engaged with the project offerings, which provided context for the interview discussions that were held. The researcher was also able to identify areas that required improvement (based on experience from the Siyakhula Living Lab and literature) for the alignment of the ICT4RED project outputs and improved teaching and learning.

During the interviews, the researcher and interviewees (teachers, subject advisors, project champions and district officials) had discussions that focused on the TPD training and the type of support available to teachers after the training was complete. This data was useful in understanding how the ICT4RED project was equipping teachers to develop the 21st-century skills desired as outlined in the programme initiation documentation. Therefore, the interview discussions and the observations made focused on the role the ICT4RED project played in Cofimvaba, of which the TPD was one noticeable role they played. Discussions during interviews also looked at whether the type of training received was sufficient to attain 21st-century skills. Interviewees had the opportunity to suggest alternative or improved ways in which they could be supported to attain the 21st-century skills desired. Teachers were also given the opportunity to express how the project services could be changed to best prepare teachers to integrate technology, specifically tablets in their teaching.

Teachers felt free to express themselves and through the interview process, the researcher could gain elaborate details beyond the observations made during field trips. As the teachers were the key recipients of the TPD training they were the best informed on whether the training they received was aiding them in integrating the tablets within their teaching. They knew their own challenges and they were the target recipients experiencing the services being provided by the ICT4RED project. Teachers, project champions and subject advisors also expressed the challenges they faced both personal challenges, such as lack of passion to use technology (teacher attitude), and challenges directly related to the project, such as limited training time available and limited ICT skills. These challenges expressed also influenced the alignment between project outputs and improved teaching and learning. For example, the level of passion teachers had for technology positively influenced their continued use of technology, which in turn influenced their level of integration of tablets in their teaching. One particular example would be of the project champion at Arthur Mfebe: she studied technology in her undergraduate years at University and enjoyed working with technology. Through the introduction of the

ICT4RED project, she was quick to start utilising the tablets to assist her in teaching English at Arthur Mfebe. Moreover, she made use of the Internet regularly to aid her in accessing supplementary material for her learners for the poetry sections of the course. Moreover, as the South African Government initiated the project, the focus was on documenting the needs as outlined by Government and their objectives of the project. Therefore, the findings for Strategic Value focused on the alignment of the needs of Government to project activities. As a result, there were findings of specific needs that teachers themselves had, such as increased pressure on teaching due to the limited availability of qualified staff. The increased pressure on teaching came about as a result of the increased workload due to the ICT4RED project. Moreover, findings from the assessment of Strategic Value highlighted that a needs assessment from the perspective of teachers and learners would be beneficial.

9.5.2.1.3. Data Analysis

The researcher was solely involved in the analysis and interpretation of the data. The researcher conducted a thematic analysis of the interview and observation data. The thematic analysis provided a qualitative account of the different activities the ICT4RED project provided to assist teachers and learners to develop 21st-century skills. The data assisted the researcher in describing the ways in which teachers and learners were being equipped to attain 21st-century teaching and learning skills. Moreover, the data comprised primarily of observations and interviews and given this research is of a qualitative nature the thematic analysis approach was deemed appropriate. From the thematic analysis, it was identified that computer skills the TPD training; increased awareness of the emerging possibilities of technology and ownership of the project; and increased interest in learning and in technology that stood out among at Arthur Mfebe.

9.5.2.1.4. Lessons Learned

Strategic Value goes beyond the role the ICT4D project plays in equipping and positioning the community to achieve the goals they desire: The community itself also has a role to play in how they are being equipped and how they are being positioned to achieve the goals they desire. It requires a two way process whereby the community itself also has to position itself to best utilise the project services being provided. Increasing the access to resources or services only provides the potential for enhanced capabilities (Gigler, 2015). The combination of increased resources/services and agency (whereby community members define their own choices and transform the increased resources/services into realised functionings) is what makes up capabilities (Gigler, 2015). For example, it was found that teachers who had a positive attitude

towards teaching and a passion for education, overcame their fear of technology and began to engage with technology to best suit their teaching needs. The isiXhosa teacher had no background in technology and she initially had a fear of using the tablets at the school. However, she had a passion for teaching isiXhosa. She went out of her way to seek the necessary assistance from the technical staff member at Arthur Mfebe on how she could improve her way of delivering lessons using tablets. She began by taking videos of various isiXhosa cultural events to demonstrate to her class as a form of an ice-breaker before beginning each lesson. After some time, she then requested assistance on ways to upload pictures onto the server so that learners could access that information given that there were a limited number of textbooks for her subject.

Findings from the assessment of outcome and impact themes can highlight the need for the implementation of particular domains of evaluation: The assessment for outcomes and impacts may highlight the need for further investigation through the application of different domains of evaluation. For example, the assessment of Strategic Value in the ICT4RED project highlighted that the teachers had needs that needed to be addressed but were not part of the project scope. As a result, a Needs assessment specific to teachers and learners will be required to fully understand the needs of the target recipients and how it fits within the scope of the needs (initial needs being addressed by the project) of Government.

9.5.2.2. Assessing Most Significant Change

Most Significant Change (MSC) describes the most significant change that has occurred at Arthur Mfebe and the surrounding community because of the ICT4RED project. Assessing MSC was an opportunity for the different project recipients, including learners, to express their views on the substantial changes that had occurred since the inception of the ICT4RED project. Unlike Strategic Value, Empowerment and Livelihoods, assessing for the most significant changes requires no particular lens as project recipients share what they view as significant.

9.5.2.2.1. Methods and Procedures

The assessment of MSC was informed by the need to understand the project recipients' view on changes at Arthur Mfebe and surrounding schools that they considered significant. Data collected employed interviews, and story-telling techniques. The interviews and story-telling methods provided descriptive views on the changes that took place since the ICT4RED project implementation and allowed unintended outcomes to emerge.

Interviews

Interviews were viewed as an opportunity to elicit a wide range of views from the project recipients on the ways in which positive outcomes could be sustained. The process was also an opportunity to identify unintended outcomes as the questions allow an open-ended discussion to develop. The interviews would allow project recipients to give details on what they considered significant and what aspects of the project they valued. As mentioned previously the researcher had assistance from the lead researcher and one of the project champions at Arthur Mfebe to arrange for interviews with different teachers, subject advisors and district officials. Moreover, interviewees could also recommend other project participants who could give details on sustaining project outcomes and mitigating any negative effects.

Storytelling

The learners from Arthur Mfebe were given the opportunity to write narratives about the ICT4RED project. The researcher was unable to interview learners and therefore the storytelling technique was an alternative approach, which worked quite well. As the DOE required that, any research should not disrupt normal teaching time it was difficult to set suitable interview times with the learners. With the storytelling narratives, the learners could complete stories in their spare time or at home and return the completed stories to school. One of the project champions assisted the researcher with selecting a group of Grade 12 learners who had been at Arthur Mfebe since the ICT4RED project began. The project champion also assisted the researcher with reiterating the requirements of the storytelling process to learners. The aim of the stories was to gain insight from the learners perspective on the major changes that had taken place as a result of the project. Moreover, it created an opportunity for learners to make recommendations on ways the project could be changed.

9.5.2.2.2. Data Collection

Interviews

Assessing for Most Significant Change produced descriptive explanations of the changes that took place at Arthur Mfebe from the point of view of the project recipients. The interviews gave the respondents the opportunity to speak about anything they felt was important to mention. Therefore, the process yielded a large amount of data as they felt the freedom to talk about anything. Teachers, project champions, district officials and subject advisors shared their views on what they viewed to be the most significant change that had occurred at Arthur Mfebe and within the project as a whole. They also shared their views on what they would change about the project. Teachers had the most to discuss about significant changes that they have observed, as they were the direct recipients of the project services and worked closely with

learners. Whereas, subject advisors and district officials focused on providing suggestions on changes they would like to see take place in the project. Moreover, through this exercise the researcher was able to identify unintended outcomes.

Storytelling

School learners were comfortable with writing narratives on the project in their spare time and write in their home language as well. The focus was on the major changes they had experienced within the project. Stories provided a rich description from the point of view of learners. Furthermore, the assessment identified unintended emergent needs because of the project, such as the need to have SIM card slots in the tablets so that learners could purchase their own data.

Learners were comfortable to express their views and they took the opportunity to express the changes they would recommend the project embrace. Learners felt free to express their concerns and talk about the project. One noticeable aspect from the stories was that the learners also took the opportunity to make new suggestions to the project team on the changes they would prefer. Learners had more suggestions for changes they would like to see rather than discussing significant changes they have experienced or see in the project. The data collected was discussed as part of Strategic Value, and Empowerment. For example, a common change that learners discussed was the need to access the Internet outside of their school hours in order to complete assignments at home. This finding was discussed as part of the Empowerment theme. The researcher ensured that the Project Champion at the school had a random selection of learners and not necessarily the top students. The researcher also had a brief meeting with the learners to ensure they understood what was required, which went well. Working with the project champion to arrange for the narratives worked well. The project champion had passion for technology and had a keen interest in the project. Therefore, she was keen to assist the researcher with collaborating with learners at the school. She ensured that each learner returned the required research consent forms from parents and that they all completed the narratives on time.

9.5.2.2.3. Data Analysis

The interviews and narratives were thematically analysed. The analysis followed an open coding approach to allow for unique findings and unintended outcomes to emerge. As the theme allowed project recipients the freedom to speak about anything they considered significant, the researcher therefore avoided analysing the data through pre-determined lenses or codes. The researcher identified the common changes that the project recipients considered

to be the most significant since project inception. From the analysis all findings could be categorised as part of Strategic Value and Empowerment and therefore, there was no identified change that could not be categorised as part of the other themes.

9.5.2.2.4. Lessons Learned

The assessment of Most Significant Change (MSC) yields results that can be categorised as part of Strategic Value, Empowerment and/or Livelihoods: Through the assessment of MSC it was found that the MSC experienced by teachers, learners, subject advisors and district officials could be categorised as part of Strategic Value and Empowerment rather than a standalone entity. For example, as part of the ICT4RED project report there was no separate discussion on the most significant change. Instead, the discussion was incorporated into the Strategic Value and Empowerment theme discussions. MSC should then be collapsed as a stand-alone theme and it should be rather emphasised as a method within the other themes. An evaluator should then assess for most significant change as an essential tool for Outcome and Impact assessment.

Most Significant Change creates opportunity for unintended outcomes/impacts to emerge: The assessment of the most significant changes allowed project recipients to express their views without any limitations on what they could focus on. Moreover, project recipients could make suggestions on changes they would like to see. Through this exercise, the emergence of unexpected project effects emerged. The assessment of MSC had no particular lens through which project recipients were bound to and therefore, it was easy for unintended effects to emerge (Batchelor and Norrish, 2005; Department of International Development, 2005; Tabassum and Yeo, 2015).

9.5.2.3. Assessing Empowerment

The assessment of Empowerment focused on identifying the ways in which teachers, learners, and subject advisors' knowledge and understanding had been expanded, their capacity to make decisions had been enhanced, their confidence had been enhanced, and their access to and management of resources had been enhanced (Alsop, Bertelsen and Holland, 2006). The fundamentals of Empowerment are reflected in Sen's capability approach, whereby, human development is viewed as expanding people's capabilities and achievements. This includes expanding what people are capable of doing and being, given the resources they have available (Sen, 2013). The capability of teachers and learners to achieve a level of teaching and learning that is of value is influenced by their resources (capitals) of which "informational capital" is a part (Gigler, 2004: 9). Therefore, information acts as an agent to strengthen teachers and

learners' assets in multiple ways (Alsop et al., 2006: 17; Gigler, 2004: 9; World Bank Group, 2012: 41). The assessment of Empowerment focused on whether ICTs had enhanced teaching and learning at Arthur Mfebe through either strengthening the teachers and learners *informational, social, and human capabilities* (Gigler, 2004: 13). Moreover, the assessment of Empowerment considered whether teachers and learners assets (psychological, informational, organisational, financial and material) had been enhanced, since taking part in the ICT4RED project, in order to make purposive choices that transform their teaching and learning.

9.5.2.3.1. Methods and Procedures

The assessment of Empowerment elicited data through interviews, observations, and preceding project documentation. All instruments were informed by the definition of Empowerment as defined by the Outcome and Impact assessment framework. Empowerment in the ICT4RED project comprised of three main components: ability to make purposive choices to utilise technology in teaching and learning, and transforming those choices into improved teaching and learning; the enhancement of Informational, Social, and Human capabilities; and the enhancement of Psychological, Informational, Organisational, and Material assets. Each instrument was tailored around the elements that made up the definition of Empowerment. For example, all interview questions were structured in such a way that they identified outcomes related to the different elements of Empowerment.

Documentation

The researcher accessed preceding documentation on the goals of the project, information on how the ICT4RED project was implemented as intended, and the lessons the project team learnt through that process. The researcher studied the information provided with specific reference to the definition of Empowerment as outlined in the Outcome and Impact Assessment framework. Documentation was reviewed through the lens of the project recipients' informational capabilities, human capabilities, social capabilities and their capacity to make purposive choices. The aim was to identify how the project influenced these elements. Moreover, the researcher planned to use documentation to add meaning to any Empowerment related findings identified from the interviews and observations made.

Observations

Observations were an opportunity for the researcher to gain primary data on the elements/variables that defined Empowerment. That way the researcher could also identify points of interest that could be investigated during interviews. The researcher planned to

observe the various ways in which project recipients' informational capabilities, such as increased informational literacy, were influenced by the project. Such observations were planned to take place during the TPD training and the various site visits to the schools, particularly Arthur Mfebe. Through the observation of informational capabilities, the researcher planned to determine how project informational capabilities influenced their human and social capabilities. Much like with Strategic Value, the researcher gained assistance from the lead researcher on the ICT4RED project team to arrange for the site visits to conduct the observations.

Interviews

From the definition of Empowerment the researcher was able to construct interview questions related to the goals of Empowerment, that is Informational Capabilities, Human Capabilities, Social Capabilities and how the teachers and learners have been empowered or not empowered to make choices. The main objective was to identify ways in which teachers, subject advisors and learners were empowered or not empowered to achieve improved teaching and learning. The interviews were an appropriate way to gain descriptive details of the levels of empowerment or disempowerment of project recipients from their own perspective. Interviews took place after the initial observations were made and were based on snowball sampling depending on the availability of different representatives from each group (teachers, subject advisors, district officials, ICT champions). The ICT champions assisted the researcher in making interview appointments with all the teachers that engaged with the project and encouraged them to participate during the interviews. The researcher was then able to have a smooth process interacting with teachers and creating suitable interview times. All interview participants felt comfortable to speak about the project as they saw the interviews as an opportunity to air their challenges as well in the hope that their voices would be heard to bring about change.

9.5.2.3.2. Data Collection

Documentation data

Prior documentation gave the researcher an overall view on the informational capabilities (such as enhanced informational literacy), human capabilities (such as increased confidence in one's abilities) and social capabilities (such as change in social interactions) that were influenced by the ICT4RED project. Preceding documentation also aided in determining which elements of Empowerment were relevant to the ICT4RED project. That way the researcher could tailor interview questions and observations for the assessment of Empowerment more appropriately.

The researcher had access to data on the ICT4RED project context and details on the TPD training offered and the operations of the project. This data aided the researcher with contextualising interview questions and provided areas of interest that the researcher could probe further during the interviews. Moreover, the Programme Action and Change theory outlined the cause-and-effect sequence of activities that would result in improved teaching and learning at Arthur Mfebe. This sequence demonstrated areas where Empowerment was expected to take place and therefore, highlighted the areas to pay attention to (such as teachers implementing teaching strategies focused on learners; teachers guiding and teaching learners in the use of technology; and the improvement of 21st-century teaching skills) during the assessment of Empowerment. All documents were available from the ICT4RED project blog and the project team.

Observation and Interview data

The researcher made several observations during field trips and made notes on the aspects that touched on the Empowerment theme. The data collected from the interviews and the observations elaborated the types of empowerment teachers and learners experienced as a result of engaging with the project. As the project was in operation for a short period it was expected that data found would focus on empowerment of use, such as growing in ability and confidence to access educational material online (which forms part of enhanced Informational Capabilities).

During the TPD training and the handover ceremony the researcher took note of how teachers' and learners' Informational Capabilities, Human Capabilities and Social Capabilities were influenced by the ICT4RED project. The researcher observed the various project recipients (teachers, and learners) and their engagement with the project. Through these observations, the researcher also had the opportunity to engage in casual conversations with teachers and gain insight on their capabilities and how they have been affected by the project. The observations made way for in depth interviews to take place by providing various cues for the interviews. Moreover, the interview discussions and observations provided data on the interaction of teachers and learners with their tablets. The majority of the data focused on different ways in which teachers and learners were empowered to make use of their tablets. Positive data found could be categorised as increased collaboration and communication among teachers between schools in the area; increased access to educational material; the personal development of project champions; and the boost in teacher confidence at the school.

9.5.2.3.3. Data Analysis

All interview and observation data obtained was of a descriptive qualitative nature and was thematically analysed for themes related to Empowerment. From the analysis it was found that results comprised primarily of outcome related findings and no concrete impacts. These Outcomes would in future result in long term Impacts.

9.5.2.4. Assessing Livelihoods

Livelihoods can be broadly defined as a means to making a living; which in the case of the ICT4RED project translates to the way of teaching and learning at Arthur Mfebe (Parkinson and Ramírez, 2006). It is influenced by one's assets and the various strategies they have available to achieve livelihood objectives they desire (DFID, 1999; Duncombe, 2006; Parkinson and Ramírez, 2006). For the assessment of Livelihoods, it was important to understand how the use of tablets through the ICT4RED affected the project recipient's wellbeing; the way teachers and learners conducted their daily activities related to education, the way they protected themselves against vulnerability; and the ways in which the use of tablets provided new opportunities for an improved future. Assessing Livelihoods focused on how the use of tablets and new teaching strategies had aided (or not) in building the assets of teachers and learners at Arthur Mfebe and enhanced their teaching and learning strategies (DFID, 1999; Duncombe, 2006; Parkinson and Ramírez, 2006).

9.5.2.4.1. Methods and Procedures

Much like with the SLL the instruments used to assess for Livelihoods were informed by the definition of Livelihoods. The researcher formulated questions centred on whether the community's livelihood strategies and wellbeing was influenced by the ICT4RED project. The data collected was elicited through the, interviews, observations, and project documentation.

Documentation

All project documentation was accessed with a purpose of understanding the effect the ICT4RED project had on the Livelihoods (the way of teaching and learning) of teachers and learners at Arthur Mfebe. The researcher anticipated that project background information and preceding evaluation information would draw attention to the various teaching strategies that were employed in the project to attain the goal of improved teaching and learning. As mentioned previously the lead researcher from the ICT4RED project team assisted the researcher with acquiring project documentation.

Interviews

Interviews were held to discuss how the tablet initiative aided in maximising teaching and learning strategies. Interviews were selected as an appropriate method as they wold provide in-depth details on ways in which teaching at Arthur Mfebe was influenced by the project. Moreover, interviews were an opportunity for project recipients to clarify or expand on findings from documentation and observations made. The aim was to identify how teachers and learners were achieving their livelihood objectives related to education; such as, improved teaching and learning and the development of 21st-century skills. Interviews were held with teachers, project champions, subject advisors and district officials. All interview questions were tailored to elicit views on the different elements that made up the definition of Livelihoods, as outlined by the Outcome and Impact assessment framework. The researcher focused on questions that would elicit data that spoke to the teaching and learning strategies, level of education, and educational assets that define Livelihoods. The researcher was then able to identify the ways in which the Livelihoods theme related to teachers and learners at Arthur Mfebe.

Observations

The researcher utilised the different components that made up the definition of Livelihoods as lenses through which to observe classroom lessons, the TPD training and the various school visits made. That way the researcher had the opportunity to identify in which way (if at all) the Livelihoods theme related to the project recipients at Arthur Mfebe. Observations were planned to provide the researcher with first-hand experience on the types of teaching and learning strategies employed to achieve project goals.

9.5.2.4.2. Data Collection

Interviews and Observations

Much like the assessment of Strategic Value and Empowerment, the interview discussions were the most informative. All participants had the freedom to express their views on how teaching and learning at Arthur Mfebe had been affected by the ICT4RED project. Teachers further provided insight on ways they felt their teaching could be improved; for example through the provision of continued training on how to contextualise 21st-century teaching strategies to suit their own subjects. Learners also provided suggestions on how improved access to the Internet could aid in their use of the tablets beyond the classroom session. The researcher had the opportunity to observe a Mathematics lesson and an Agricultural Management Practice (AMP) lesson. During these lessons, the researcher took note on the ways in which tablets were utilised by both learners and teachers as part of their new teaching and learning strategies. A

shortcoming of this observation was that in both cases the teacher was providing a demonstration on ways in which they utilised tablets for their teaching and how they integrated technology in the lesson. Therefore, there is a high possibility that it was purely for demonstrative purposes and was not a regular practice. This is especially the case for the AMP subject as the teacher did mention in one pf her interviews that she does not integrate tablet technology in her teaching, as there is insufficient content available on the school server for her subject. Moreover, one interviewee did mention that teachers at first do implement the new teaching strategies but after some time they go back to their traditional ways of teaching. Prolonged observations were not a possibility as it was outlined that any research activity and ICT4RED project related activity should not interfere with the school calendar year. Therefore, all research activities were limited to particular times and one could not conduct regular observations at the school as it was considered a form of distraction. During the TPD training sessions the researcher attended, the researcher was exposed to the various 21st-century teaching strategies mentioned in the project documentation. The researcher had the opportunity to observe and engage in casual conversations with teachers on their opinion of the new teaching strategies. Through this process, the researcher aimed to identify themes that were relevant to Livelihoods, based on the definition of Livelihoods.

Overall data collected comprised only of outcomes as the project had only been in operation a short period (two years) at the time of the Outcome and Impact assessment. Therefore, no long-term impacts had been recorded. Moreover, the researcher had to rely on the opinion of teachers, as there was no quantitative evidence on the change or improvement in learners' marks. A tracer study would be recommended over a period of time whereby a set of learners' performance will be traced and recorded over consecutive years including a few years post school. Moreover, learners, particularly Grade 11 and 12 learners had only been using the tablets for one year, which is not sufficient to determine whether their performance has improved as a result of the ICT4RED project. There are other factors that influence learners' performance. For example, learners' general academic strengths and social factors from their respective homes can influence performance.

The assessment of Livelihoods appeared to be the most practical for interviewees to talk about and all discussions on other themes pointed to the Livelihoods theme. For example, when interviewees spoke about how the ICT4RED project was equipping them to develop 21st-century teaching and learning skills (related to Strategic Value), they would also go on to talk about how their teaching and learning strategies (related to Livelihoods) have changed (for

some) and how they have not changed (for others). It was found that Livelihoods related to a tangible goal the school desired to achieve – improved teaching and learning and enhanced 21st-century skills, and hence the ease at which interviewees felt to converse.

Documentation

The researcher had access to sufficient documentation on the TPD training modules and the new teaching strategies that teachers were exposed to. This data was beneficial in understanding how the teachers way of teaching had been influenced and ways in which it has changed to improve teaching at Arthur Mfebe. However, there was limited documentation on the various strategies teachers employed to teach prior to the implementation of the ICT4RED initiative. There was also limited documentation on the learning strategies learners employed. Such information would aid in how the ICT4RED project affected the teaching and learning strategies employed at Arthur Mfebe. Therefore, it was during the interviews that the researcher identified that several teachers had difficulties adjusting to the new teaching strategies and felt they took up time, which then affected their teaching time available and subsequently the quality of their teaching. Moreover, there was minimal documentation on Process assessment related data such as *level of use, perceived usefulness, units received* and *sustainable use factors*. Such information would aid in understanding why a minimal change in teaching strategies has taken place and only among a few teachers.

9.5.2.4.3. Data Analysis

All data from the interviews and observations was thematically analysed for outcomes related to Livelihoods. Once again, the data was all descriptive in nature and therefore, identifying common themes and themes that stood out that related to Livelihoods worked well. The aim was to formulate a description on the ways in which the teachers and learners livelihoods were affected by the project. The researcher was also aiming to identify whether the assessment of Livelihoods was relevant in the ICT4RED project and if it was an important aspect to consider when assessing future ICT4D initiatives. From the analysis, aspects related to Livelihoods stood out most as they related closely to the end goal of the ICT4RED project – improved teaching and learning. For example, from the assessment of Livelihoods the findings from the analysis focused on the way teaching and learning was taking place post the ICT4RED project implementation and the role the project played in facilitating any changes that had occurred.

9.5.2.4.4. Lessons Learned

The alignment between project outputs and community goals is important for understanding the types of Livelihood outcomes: Much like with the SLL, the level of alignment between project services and activities with the goals of the project recipients is important to understand the Livelihood outcomes identified. Therefore, an evaluator can add meaning and context to the Livelihood outcomes/impacts identified. For example, the limited opportunities to learn how to contextualise the TPD training to suit one's (teacher) context speaks to the level of alignment between project services (TPD) and project goals (enhanced teaching). Subsequently such an understanding aids in understanding why there was minimal integration of ICTs in the classroom taking place.

9.5.2.5. Assessing Sustainability

Sustainability aims to determine the means and ways in which an ICT4D initiative has contributed towards sustainable development (Balancing Act, 2013; Unwin, 2009: 365). *Sustainability* determines whether the positive outcomes from all other themes are able to cope with the constantly changing rural environment and project context, and do not undermine other goals and objectives the school and Department of Education might have. The assessment of Sustainability focused on identifying the mechanisms put in place by the ICT4RED project and project recipients that support and ensure that positive project outputs, outcomes and impacts are sustainable (Ali and Bailur, 2007; Batchelor and Norrish, 2006; Souter, 2012). The assessment provided insight into whether the positive effects of *Strategic Value, Empowerment* and *Livelihoods* are long term. The assessment also aimed at identifying the ways in which all negative outcomes identified, such as the limited use and integration of technology in the classroom, are being mitigated.

9.5.2.5.1. Methods and Procedures

The assessment of Sustainability elicited data through interviews, observations, and project documentation. All instruments were informed by the aims of the Sustainability theme as outlined in the Outcome and Impact Assessment framework. All instruments aimed to determine what the project recipients and project team are implementing to ensure that positive outcomes are sustainable and all negative outcomes are short lived.

Documentation

The researcher planned to review project documentation with reference to the existing project services offered and activities that project recipients were engaged in. The researcher reviewed

documentation on the functions of the ICT4RED project and its operation. These aspects were important in understanding the functions and operations that played a role in developing the outcomes identified. The researcher was then able to probe during interviews and make observations on the ways in which these functions and operations will continue in the near future. Moreover, referring to project documentation particularly evaluation documentation was in line with the need to have a holistic picture of the project effects, particularly the sustainability of those effects. Project documentation was also anticipated to add meaning to findings from interviews and observations.

Interviews

For all interview participants the researcher planned to ask questions structured around the definition of Sustainability. The aim was to elicit the views of the different target recipients on the ways in which the project activities and outcomes that were being identified will be sustained. Their views were important as management of the project was being handed over to them in 2015a (three years post project implementation). All discussions around Sustainability were made towards the end of the interview process after discussing aspects related to Strategic Value, Most Significant Change, Empowerment and Livelihoods. That way the researcher could elicit answers on how outcomes related to all other themes were being sustained or if, there were any plans on how to maintain positive outcomes.

9.5.2.5.2. Data Collection

Documentation

Documentation on project services and activities included information on sustainability factors that the project has worked on, such as the development of an ICT committee at the school to own and drive the project. Documentation also included factors that still needed attention, such as the maintenance of the network infrastructure. Such data was beneficial in understanding how outcomes may be sustained and pave way for further sustainability discussions with the project recipients and project team. This information was readily available from the ICT4RED project blog.

Interviews

The researcher had discussions with the subject advisors, district officials, project champions and teachers about the policies put in place to sustain the project and any positive outcomes and impacts that were being identified overtime. Interviewees, especially teachers had several suggestions on ways the Project could be sustained. Suggestions were centred on providing

continuous and more rigorous training and support, and developing the teachers' motivation and passion to use technology for teaching as necessary factors needed for sustainability. As the project recipients shared the management and ownership of the project with the project team, they all had some ideas on the way forward for the project. Teachers, subject advisors and district officials all knew that the project would be handed over to them in 2015 and therefore, the discussions around Sustainability was something they all considered as important factors to consider if the project is to continue in the near future. The main findings were based on sustaining the existing project activities and services (outputs, such as the training and maintenance of the tablets) and on some of the outcomes that had been identified during the data collection phase. Outcomes that were identified only after all data was consolidated and analysed are yet to be discussed with project recipients.

9.5.2.5.3. Data Analysis

All data collected was thematically analysed for ways in which positive outcomes and impacts were being sustained. The researcher reviewed and consolidated all the data related to Sustainability to have a qualitative description of the plans the ICT4RED project was putting into place to sustain the project. Moreover, the researcher was able to highlight areas that project recipient were not aware on how certain project activities would be sustained in the long term. As the findings from the overall Outcome and Impact assessment occurred at the end of the data collection period, the researcher does require a final discussion with the project recipients. Such a discussion would allow the project stakeholders the opportunity to reflect on the outcomes found and the ways in which they plan to sustain the positive Outcomes and to mitigate the negative ones.

9.5.2.5.4. Lessons Learned

A follow up discussion to discuss and reflect on the assessment findings is necessary: Once the assessment process is complete and a report on the findings has been formulated it is important for the project stakeholders to have the opportunity to discuss and reflect on project findings (Patton, 1997; 2013). Such a discussion would further aid the stakeholders in developing a formal plan on how they would like to sustain positive Outputs, Outcomes, and Impacts from a project. Moreover, stakeholders will also have the opportunity to discuss ways in which negative findings can be resolved. These discussions can only take place once all outcome and impact findings have been presented. Therefore, the assessment of Sustainability is a continuous process that extends beyond the completion of the Outcome and Impact assessment report.

9.5.2.6. Summary of data collection instruments according to themes

Table 9.5 highlights the instruments used to collect data for each theme in the assessment of ICT4RED project. Moreover, Table 9.6 highlights a summary of the challenges faced for using the different instruments.

Table 9. 5: ICT4RED data collection instruments

Outcome/Impact Theme	Data Collection Instrument
Strategic Value	Documentation
	Observations
	Interviews
Most Significant Change	Story-telling
	Interviews
Empowerment	Documentation
	Observations
	Interviews
Livelihoods	Documentation
	Observations
	Interviews
Sustainability	Documentation
	Interviews

Table 9. 6: Challenges of data collection instruments

Data Collection Instrument	Challenge Experienced
Documentation	The project did not have formal assessments in accordance to the different domains of evaluation. Moreover, the researcher did not gain access to project documentation detailing the evaluations that were conducted previously. Therefore, the researcher had to utilize the available content and relate it to the type of data the different domains of evaluation aim to gain.
Participant Observation	The researcher was not able to conduct suitable observations of class lessons. The classroom observations that did occur where planned sessions were the Maths and Biology teachers decided to demonstrate how they integrate tablets in their teaching. Therefore, the researcher could not conduct participant observations in a more "natural" (day-to-day classroom lessons) setting. However, the researcher had the opportunity to participate in the teacher training that was being offered and was able to utilize other instruments to collect data.
Interviews	No real challenge was experienced conducting interviews. However, given that teachers and subject advisor had full schedules the researcher was constrained setting interview times. Moreover, the researcher was unable to have formal interviews with key project evaluation team members as they were located in different cities and were not able to set a time for formal interviews.

Story-telling	Given the challenges experienced in the SLL with story-telling the researcher changed her approach and therefore had minimal challenges when collecting data in the ICT4RED. The researcher did however have a challenge of gaining story narratives from all the learners in the final school grade mainly because they could not all return their consent letters from their parents.

9.5.3 Summary of Lessons Learned from the Assessment of Outcomes and Impacts: ICT4RED

Table 9. 7: Summary of Lessons Learned – ICT4RED

Theme	Lesson Learned
Application of Evaluation Guidelines	Stakeholder relationships are important in facilitating an Outcome and Impact assessment process.
	Access to detailed evaluation findings from prior evaluations is important for the analysis of Outcome and Impact assessment results.
	Immersion in the project context is important for an outcome and impact assessment.
	Engaging stakeholders in the evaluation process creates an environment for the empowerment of stakeholders to occur.
	Access to detailed evaluation findings from prior evaluations is important for the analysis of Outcome and Impact assessment results.
	Preceding evaluations that have taken place aid in contextualising outcome and impact themes and other evaluation domains.
Strategic Value	Strategic Value goes beyond the role the ICT4D project plays in equipping and positioning the community to achieve the goals they desire.
	Findings from the assessment of outcome and impact themes can highlight the need for the implementation of particular domains of evaluation
Most Significant Change	The assessment of Most Significant Change (MSC) yields results that can be categorised as part of Strategic Value, Empowerment and/or Livelihoods.
	Most Significant Change creates opportunity for unintended outcomes/impacts to emerge
Empowerment	N/A
Livelihoods	The alignment between project outputs and community goals is important for understanding the types of Livelihood outcomes
Sustainability	A follow up discussion to discuss and reflect on the assessment findings is necessary.

9.6. COMPARATIVE REFLECTION ON THE SLL AND ICT4RED

The implementation of the Outcome and Impact assessment framework in both the SLL and ICT4RED project were opportunities to demonstrate the proposed framework in two real-life case studies. In both cases, the researcher identified similarities and differences in the process of implementing the framework and conducting the assessment for Outcomes and Impacts. The

following section outlines the key similarities and differences identified from the researcher's experience utilising the Outcome and Impact assessment framework.

9.6.1. Application of Evaluation Guidelines

9.6.1.1. Stakeholder Relationship

In both the SLL and the ICT4RED project, the researcher found it valuable to develop a close relationship with various project stakeholders. Identifying stakeholders who were interested in the evaluation process and interested in the evaluation findings was beneficial as the relevant stakeholders became involved in the evaluation process and assisted the researcher throughout the process. It should be noted that the study focused on the needs of end-users (project beneficiaries) as they are the ones whose lives should be impacted (the target of this 'development' taking place). Therefore, the study did not place emphasis on reflecting on the roles of different stakeholders. There is further need for a critical analysis of the different stakeholders based on their concerns and interests in the project.

Drawing on Patton (1997; 2013), working with intended users of the evaluation and identifying intended uses of the evaluation information proved important for evaluation findings to be useful in both projects. Moreover, involving stakeholders in the evaluation process creates a sense of ownership and facilitates the overall process (O'Neil, 2002; Reilly and Gomez, 2001; Rogers, et al., 2011 and Patton, 2013). In both case studies, the evaluation was required for learning purposes to learn from and improve the project to ensure that project recipients continued to gain from project services and the resources provided. In the SLL, the project had been operating for over eight years and it was expanding to more schools. Therefore, an Outcome and Impact Assessment was required to help improve the project for the expansion to be successful. Although the ICT4RED project had been operating for a much shorter period, the project was planned to expand to all the schools within the Cofimvaba district; therefore the project needed continuous evaluation to take place and to understand the evolving outcomes that have been occurring in order to learn and enhance the project for its continued expansion. In both case studies, the researcher worked closely with the ICT champions and key project team members. In the SLL, the researcher engaged with the ICT champions from each of the schools were data collection took place. The ICT champions assisted with identifying ways considered appropriate to conduct the evaluation. Moreover, the input from the ICT champions and several teachers on the data collection instruments used aided the researcher in revising the research instruments. For example, ICT champions provided suggestions on questions to

explore during interviews. Furthermore, the project leader and founder for the SLL reviewed the proposed evaluation instruments and provided their suggestions for improvement and changes. Within the ICT4RED project, the researcher interacted closely with one of the ICT project champions at Arthur Mfebe. The project champion provided her input on ways she considered effective to conduct the evaluation within the ICT4RED project context. She further assisted with linking the researcher with other teachers at the school who could participate in the evaluation process. Such interactions with stakeholders in both case studies facilitated the evaluation process and aided in learning and improving the evaluation process as it occurred. Interactions with stakeholders also aided with understanding how the evaluation findings could be beneficial to the users and how they could use such information. For example, the district officials who were part of the ICT4RED project indicated that they need continuous data on how the project is performing, as they would like to see improvement in education in their circuit. They would like their circuit to perform well as a whole and as a result, learning from the project in order to improve it is something they consider important. As one district official put it:

> "*We want the sustainability of this project for the whole circuit … because they give us wonders in our schools*".

In the SLL, the researcher had been involved with the computer literacy training and conducting observations over a period. A lengthy engagement period within the project allowed the researcher the opportunity to develop and grow relationships with different stakeholders and specifically teachers at the schools and some of the community members. Such relationships aided the researcher in having a rich experience in the field and collecting a wider range of data. Moreover, the researcher could conduct more observations throughout the various site visits. Whereas within the ICT4RED project, the researcher had limited site visits, given the restrictions on when research trips could be conducted to avoid disturbing the school calendar. As a result, the researcher could not conduct sufficient observations and depended heavily on interview data. The researcher did note that teachers at the school could conduct their own observations and reflect on their experience in the project.

9.6.1.2. Application of Comprehensive Evaluation

In both case studies, the researcher had access to documentation on prior evaluations that both projects conducted. The SLL had a baseline study report, a needs assessment report, a programme theory assessment report and a process assessment report, which formed part of

the on-going research on the Rural ICT Comprehensive Evaluation Framework (RICT-CEF). The SLL Outcome and Impact assessment report conducted as part of this research would then form the fifth domain of evaluation of the RICT-CEF. The ICT4RED project had documentation on the background to the project, the implementation of the project and the methods followed to monitor and evaluate the project. The prior evaluation documentation aided the researcher in contextualising the Outcome and Impact assessment framework to suit the two case studies and provide meaning to the outcomes and impacts identified. However, the ICT4RED case study did not have distinct evaluations categorised according to the different domains of evaluation of the RICT-CEF. Instead, it had evaluations conducted throughout the project implementation to learn and improve the project implementation through subsequent phases, which formed part of the Developmental Evaluation (Patton, 2010) approach that was followed. Moreover, the evaluation documentation that was available focused on the process followed to implement the ICT4RED project, with a high-level description of the results and lessons learnt by the ICT4RED project monitoring and evaluation team, whereas, within the SLL, the researcher had access to the full findings of all preceding evaluations. Therefore, as part of the Outcome and Impact assessment process for the SLL, the researcher had more reference points to better understand the data as part of the data analysis process. For example, the Process Assessment data indicated that the majority of users were the teachers at the schools. From the Outcome and Impact assessment, the researcher found that the teachers were the most positively impacted project recipient group by the SLL as they were the active users of the project services. As part of the ICT4RED project Outcome and Impact assessment process this minimal reference points the researcher could make beyond the project background information that was available. Although, the high-level findings on the preceding evaluations were useful, more detailed evaluation results would have given the findings more meaning and situated the results more appropriately. For example, detailed data on use factors, how project recipients used the project resources and their perceptions on the use would help explain the limited integration that had been taking place at Arthur Mfebe. In both case studies, the Outcome and Impact assessment findings can be used to also inform the assessment of future project needs and help improve the project design for future expansion and the sustainability of the project. Results for the ICT4RED project were outcome-based and partly related to the full-scale process assessment that was necessary for the project. The project had been in operation for a short period and therefore the researcher identified no impacts, whereas, the SLL demonstrated several impacts on the community.

In both the ICT4RED project and SLL, the researcher found results that further confirmed prior evaluation findings. For example, the majority of the evaluations (Needs assessment, Programme Theory assessment and Process assessment) conducted in the SLL were conducted by an evaluator outside the project. The researcher found that only a limited number of the lessons learnt from these evaluations were indeed implemented. As a result, the researcher found that some of the lessons learnt came up again during the Outcome and Impact assessment. For example, from the Process assessment the researcher found that the project recipients did not utilise the project services regularly, partly because the type of training they had received was kept broad and not contextualised. As part of the Outcome and Impact assessment, it emerged again that the training offered was not contextualised and as a result community members were not aware of how to utilise their new computer literacy skills to facilitate change in their lives, therefore only a few individuals experienced positive impacts. Within the ICT4RED project, the project team conducted the prior evaluations internally, which the project termed as "self-evaluation". They also had assistance from an external evaluator. Through this process, the project team conducted a self-reflection and highlighted what they had learnt and indicated the changes made in subsequent phases to incorporate the lessons learnt. One finding that re-emerged during the Outcome and Impact assessment was the concern teachers had that, they do not know what learners are doing on their tablets.

9.6.1.3. External Environment

Through the various stakeholder relationships, the researcher gained insight on the environment in which the both projects operated and potential factors that could influence the Outcome and Impact results found. For example, in the SLL the researcher identified that the Department of Education was phasing out the use of physical annual reports that were completed by each school in Dwesa. School principals were now required to submit electronic records of the school reports. Therefore, teachers and principals from several schools felt the pressure to learn how to utilise ICTs in order to fulfil the demands of the Department of Education. This in turn influenced their engagement in the SLL and the desire to participate and make an effort to apply the skills taught during the computer literacy training. In the ICT4RED project, the Department of Education had its own internal measures implemented to try to improve education in the District, such as a Winter School for the final year (Grade 12) learners and various workshops for teachers. These activities increased the workload of teachers; therefore, the activities and expectations from the ICT4RED project appeared to add more to teachers' workload, and hence the complaint from teachers and district officials that,

"It takes up a lot of time using technology", and as another teacher put it, *"that's the most ... discouraging thing because it takes time"*.

9.6.1.4. Ethical Considerations

Ethical practice throughout the assessment process was important in both case studies. The researcher had to follow appropriate channels in order to conduct the assessment successfully. In both cases engaging with stakeholders in the early stages of the assessment process aided with ensuring that minimal harm (Mthoko and Pade-Khene, 2013) to project recipients took place because of the Outcome and Impact assessment process.

9.6.2. Application of Outcome and Impact Themes

In both case studies, the researcher assessed all themes at the same time. For example, during the interview discussions the researcher spoke about all the themes and asked questions that progressed from Strategic Value through to Sustainability. The researcher utilised similar data collection instruments in both case studies. Observations, Interviews and Narratives from learners were the tools implemented in both studies. However, the researcher also made use of the survey instruments in the SLL. The survey instrument captured a wide view from a larger sample of the population to determine the consensus on the effects of the SLL in Dwesa. Within the ICT4RED project, the target sample size was small and was not appropriate for a survey. The assessment conducted focused on Arthur Mfebe, whereby the researcher was able to interview all the teachers who were making use of the ICT4RED project services. Therefore, a survey was also not required. In both case studies, the use of observations was enriching. Through observations, the researcher had an opportunity to engage project stakeholders in casual conversations about the project over a period, which they felt more comfortable with rather than a formal interview process. In both case studies, the reference to project documentation and the interactions with project champions assisted the researcher in contextualising the proposed instruments to suit the projects.

The Outcome and Impact assessment framework highlighted a wide range of Outcomes and Impacts in both case studies, and pointed to areas of interest that may require attention. The wide range of data provides an overview of the effects of the project and allows the project teams to identify points of interest that they feel require further analysis. For example, within the ICT4RED project, findings on the teachers' perception of training received and its influence on the integration of technology in the classroom is work that requires in depth analysis to the extent that that a further research study is being conducted on that particular aspect. Moreover,

findings related to the ICT4RED's influence on some learners developing desires to pursue IT related careers can be investigated further. In the SLL, the provision of contextualised computer literacy training to community members is another point of interest that the project team can investigate to improve the kind of training provided to the community.

In both case studies, the assessment process highlighted the realities on the ground and the various issues that rural areas face. For example, in the ICT4RED project there are challenges with unqualified teachers required to teach subjects they are not trained in. In the SLL, the desperation of community members for quick fixes, as well as deeper underlying concerns, need to be addressed and cannot be resolved through the ICT4D initiative alone.

9.6.2.1. Assessing Strategic Value

The assessment of Strategic Value revealed that project recipients also have a responsibility in positioning themselves to take advantage of the opportunities by an ICT4D initiative. In both case studies, the researcher identified that the attitude and behaviour of the project recipients influenced the ways in which they were equipped to achieve the goals they desired. Within the SLL, the needs that were being targeted by the project were needs that the community itself identified. Therefore, when assessing for Strategic Value it appeared straightforward, as the aim was to identify the ways in which the project was equipping the community to fulfil their needs, whereas for the ICT4RED project it was slightly different. The aims of the project came from the South African Government to improve rural education through innovation utilising technology. Therefore, the assessment for Strategic Value aimed to identify how project recipients were being equipped to improve education. Through this process the researcher identified that there were emerging needs that resulted as a means to fulfil the aims of Government. The researcher then had to take into account how the project recipients were being equipped to fulfil the emergent needs as well.

9.6.2.2. Assessing for Most Significant Change

The assessment for Most Significant Change identified results that could be categorised as part of the other four Outcome and Impact themes. Therefore, the researcher acknowledged that MSC should instead be incorporated as an essential method to collect data within the other themes. It does not need to be presented as a separate entity. Moreover, the assessment of Most Significant Change highlighted unintended outcomes/impacts, which makes it a useful method for identifying future unintended project effects.

9.6.2.3. Assessing for Empowerment

The assessment for Empowerment in the SLL was quite generic as the project aims were also quite generic and kept broad. As the SLL was not tailored to meet one particular need, but rather a range of needs, its aims were broad. Therefore, the assessment of Empowerment had to cover a wide range of variables, from health, education, income generation, employment, communication, culture, etc. The researcher had to have questions that covered this broad spectrum of factors. For example, indicators for Empowerment ranged from identifying whether community members had the ability to access information to make informed decisions, to whether the SLL influenced the community's ability to improve health in the community and income generation strategies. Within the ICT4RED project, the assessment for Empowerment was quite specific as the project focused on improving education in the Cofimvaba district, specifically 21st-century teaching and learning skills. As the project had more focused aims, it made the assessment process straightforward. All ICT4D projects should have a clear set of aims and goals they would like to achieve and rather have a focused approach with a clear programme theory that covers all the goals of the project. For projects that have a wide range of goals and no specific direction they would like to follow, evaluators should also keep the evaluation process quite broad so as not to miss any of the planned goals of the project.

9.6.2.4. Assessing for Livelihoods

The assessment of Livelihoods showed to be an important aspect to consider in both projects. Through the observations made and through the interview discussions, all project recipients focused on aspects related to Livelihoods (ways in which they lived their lives). In both projects, the Outcome and Impact assessment participants related more to their end goals and aims through the project, which related to the Livelihoods theme. From the data collected, the researcher observed that participants paid less attention to the *processes* that would lead to their end goals but rather preferred to dwell on the achievement of end goals. For example, participants equated project success to the attainment of the desired end goal and not necessarily the process that would lead to the attainment of goals.

9.6.2.5. Assessing for Sustainability

Through the assessment of Sustainability, the researcher acknowledges that a workshop will be required to discuss Outcome and Impact assessment findings in detail with key stakeholders. As indicated by Patton (2013, 16) "the report is not the end of the evaluation". It is important to follow up on the findings with users and a workshop is one way to do so. The aim would be

to gain their insights on the results and initiate discussions on ways in which the teams will sustain the positive Outcomes and Impacts and mitigate the negative effects.

9.7. CONCLUSION

This chapter discussed how the researcher implemented and applied the Outcome and Impact Assessment framework within the SLL and ICT4RED project. It involved a reflective exercise of the different components of the framework in a real life setting. The researcher found that the preceding domains of evaluation were essential in the overall assessment of the SLL and ICT4RED project. Preceding assessments, such as the Baseline Study, Needs Assessment report, Programme Theory Assessment, and Process Assessment provided relevant data that aided in understanding and explaining the outcomes and impacts that were identified in the SLL. Although, the ICT4RED project did not have distinct evaluations for the assessment of Needs, Programme Theory and Processes, the researcher was able to utilise the summary findings that were made available.

The assessment of the five themes – Strategic Value, Most Significant Change, Empowerment, Livelihoods and Sustainability – aided with describing the effects of the SLL and ICT4RED project. All themes worked together to describe the SLL and ICT4RED project and could not be kept in complete isolation from one another. For example, the assessment of Strategic Value provided a basis on which the discussion for empowerment and livelihoods developed. Furthermore, the assessment of Most Significant Change resulted in outcomes and impacts that could be categorised as part of Strategic Value, Empowerment, or Livelihoods. Therefore, it was suggested that the Most Significant Change theme should be collapsed as a distinct theme. It should rather be an essential method to be incorporated within Strategic Value, Empowerment and/or Livelihoods. The reflective exercise provided lessons learned for the enhancement of the Outcome and Impact Assessment framework through determining its suitability within the selected case studies.

Chapter 10: An Enhancement of the Outcome and Impact Assessment Framework

10.1. INTRODUCTION

10.2. REVISIONS TO THE THEORETICAL OUTCOME AND IMPACT ASSESSMENT FRAMEWORK

10.2.1. Evaluation Guidelines

10.2.2. Outcome and Impact Themes

10.2.2.1. Strategic Value

10.2.2.2. Most Significant Change

10.2.2.3. Empowerment

10.2.2.4. Livelihoods

10.2.2.5. Sustainability

10.2.3. Preceding Domains of Evaluation

10.2.4. The overall structure of the Outcome and Impact Assessment Framework

10.2.5. The application of the Outcome and Impact Assessment Framework

10.3. SUMMARY

10.1. INTRODUCTION

The development of the theoretical Outcome and Impact assessment framework required an application of a working prototype of the framework within a real life ICT4D environment. The theoretical framework has been applied in the Siyakhula Living Lab (SLL) and the Information and Communication Technology for Rural Education Development (ICT4RED). The application process has resulted in lessons learned and reflections, which when applied yields a revised Outcome and Impact assessment framework.

The following chapter outlines a summary of the revisions that have been made to the theoretical Outcome and Impact assessment framework based on the lessons learned and reflections in the SLL and the ICT4RED initiatives. Revisions to the different components that make up the framework are presented. Revisions to the overall structure of the framework are then outlined. Lastly, a review of the application of the framework in both case studies is summarised. It is concluded that the iterative application of the framework in different case studies will result in the continuous revision to the framework. Moreover, the application of the framework in different cases acts as a basis on which different cases can learn from one another.

10.2. REVISIONS TO THE THEORETICAL OUTCOME AND IMPACT ASSESSMENT FRAMEWORK

The theoretical Outcome and Impact assessment framework was developed from the Rural ICT Comprehensive Evaluation Framework (RICT-CEF). It forms part of the domains of evaluation as depicted in Figure 10.1. As part of the Outcome and Impact assessment domain, the theoretical framework guiding such an assessment was developed from an analysis of Impact assessment frameworks from IS programmes, IS/IT programmes and ICT4D programmes. The analysis yielded key Outcome and Impact themes that form the basic elements that demonstrate development through an ICT4D initiative. The implementation of the framework in the SLL and ICT4RED project rendered revisions on the theoretical Outcome and Impact assessment framework as outlined below.

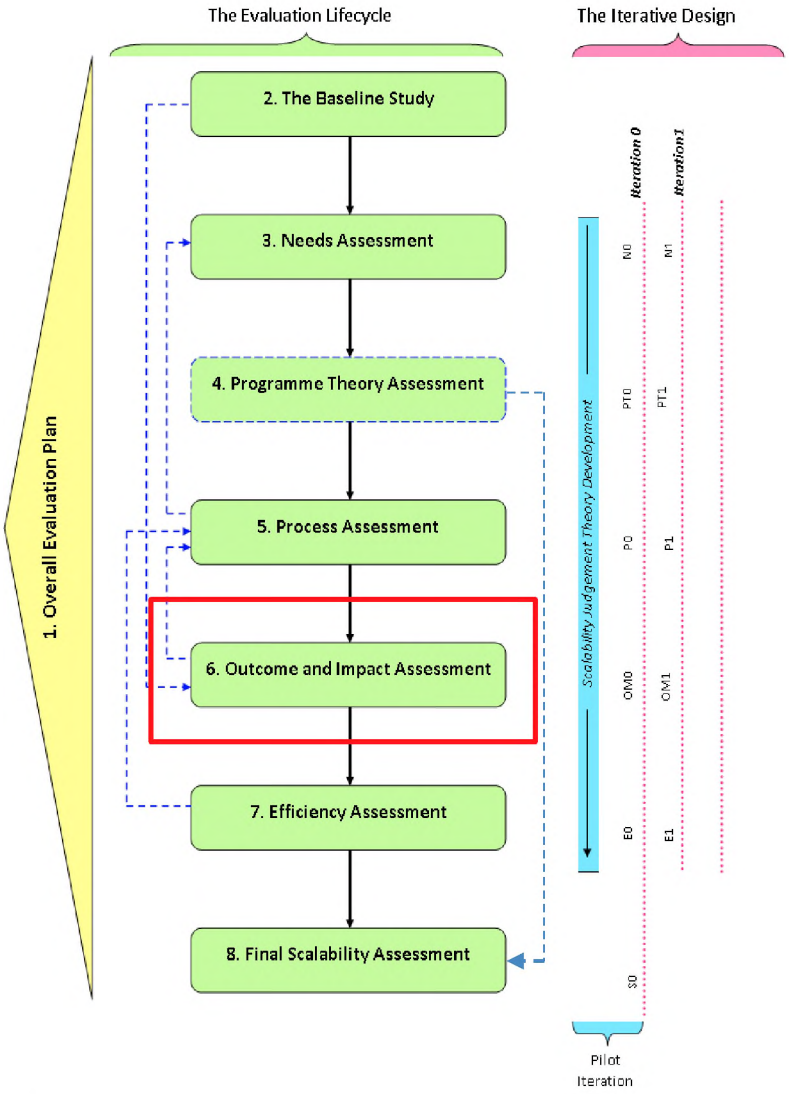


Figure 10. 1: Rural ICT Comprehensive Evaluation Framework

10.2.1. Evaluation Guidelines

The application of the evaluation guidelines was beneficial to the overall assessment process. The researcher applied all aspects of the Guidelines in both the SLL and the ICT4RED project. The application of the *Stakeholder Relationships, Application of Comprehensive Evaluation, External Environment* and *Ethical Considerations* were successfully implemented. Overall, the process was successful and no changes have been made to the Guidelines. However, from the application of guidelines, a key aspect learned was the emphasis on engaging stakeholders throughout the assessment process, as outlined in Table 10.1. The importance of the Stakeholder Relationship was not adequately emphasised by the researcher in the initial theoretical framework.

Table 10. 1: Revisions to the Evaluation Guidelines Component

Lesson Learned/Reflection	Component of framework affected	Revisions to be made
Evaluation Guidelines		
1. Stakeholders are key in facilitating the Outcome and Impact assessment process	Stakeholder Relationship	Engaging stakeholders from the onset of the evaluation process and throughout the evaluation is important. Their input is beneficial as they can assist with the contextualisation of the theoretical framework to suit the ICT4D initiative, development of assessment methods, identification of participants, providing guidance on conducting the assessment process in an ethical manner, and interpreting results. Therefore, the Stakeholder Relationship component is relevant for ensuring that users of the evaluation are identified, and the uses of the evaluation findings are outlined. The principles for utilisation-focused evaluation outlined by Patton, 2013 are an essential guide for effective stakeholder relationship and enabling the use of evaluation findings.
2. Project recipients, particularly project champions, are key informants for planning an evaluation	Stakeholder Relationship	Project champions and select community members should be involved in developing the evaluation plan.
3. Collaborating with stakeholders creates an opportunity for empowerment evaluation to take place	Stakeholder Relationship	Empower stakeholders by actively engaging them throughout the assessment process.
4. Preceding evaluation data is relevant for contextualising the outcome and impact assessment framework	Preceding Domains of Evaluation	Contextualise the outcome and impact with reference to preceding evaluation findings.
5. Immersion in the project context is important for an outcome and impact assessment	Stakeholder Relationship	Consider immersing oneself in the project domain as an effective means of identifying project effects.
6. Access to detailed evaluation findings from prior evaluations is important for the analysis of Outcome and Impact assessment results	Preceding Domains of Evaluation	Ensure that the analysis of Outcome and Impact findings is in context of preceding evaluation findings.
7. Preceding evaluations that have taken place aid in contextualising outcome	Preceding Domains of Evaluation	Consider prior evaluation findings when contextualising Outcome and Impact themes

and impact themes and other evaluation domains		

10.2.2. Outcome and Impact Themes

The application of themes was realised in both case studies. The theoretical Outcome and Impact assessment framework outlined various methods for collecting data. The methods proposed do not change, however there were lessons learned through their application outlined in Table 10.2.

Table 10. 2: Revisions to the Outcome and Impact Assessment Themes

Lesson Learned/ Reflection	Component of framework affected	Revisions to be made
Outcome and Impact Themes		
1. Participant Observations provide a relaxed environment for participants to engage in casual conversations	All Outcome and Impact themes	Participant observations, over a period, are an essential method to incorporate throughout the assessment period. Research participants should be engaged in casual conversations throughout the observation period to elicit their views about the ICT4D initiative.
2. For the assessment of Empowerment, community members should be encouraged to complete surveys based on their own experiences	All Outcome and Impact themes (Particularly Empowerment and Livelihoods)	Ensure that research participants are aware of the purpose and benefits of the evaluation, and create a comfortable environment for participants to express themselves freely and complete surveys based on their experiences and not to impress the evaluators.
3. Survey questionnaires should be phrased in such a manner that community members own the questions being asked	All Outcome and Impact themes	Ensure that survey questions are phrased appropriately for research participants to own. When ICT4D initiative does not have clearly outlined and specific goals (as opposed to generic goals that are varied) detailed contextualisation of questions may be difficult, therefore questions should be appropriately phrased and targeted specifically to participants. Moreover, it is important to ensure that the evaluation is flexible enough to adjust survey instrument throughout the assessment process.

10.2.2.1. Strategic Value

Changes to Strategic Value are reflected in its assessment indicators, which are outlined in Table 10.3. The definition of Strategic Value has been expanded to emphasise the need to hold project recipients accountable beyond the project itself.

Table 10. 3: Revisions to the Strategic Value Theme

Lesson Learned/Reflection	Component of framework affected	Revisions to be made/Action
	Strategic Value	
1. The Strategic Value of a project should be clear and clearly communicated to community members	Strategic Value assessment definition	As part of the assessment ensure community members are aware of the outputs, services and aims of the project. Moreover, consider whether community members are aware how project services will translate into Outcomes and Impacts.
2. Strategic Value goes beyond the role the ICT4D project plays in equipping and positioning the community to achieve the goals they desire	Strategic Value assessment definition	Consider the role project recipients are playing to equip themselves and position themselves to best benefit from the project outputs and services being provided.
3. An Outcome and Impact assessment informs other domains of evaluation	Domains of evaluation	Include evaluation domain specific findings as part of the expected assessment outputs.
4. Findings from the assessment of outcome and impact themes can highlight the need for the implementation of particular domains of evaluation	Domains of evaluation	Include evaluation domain specific findings as part of the expected assessment outputs.

10.2.2.2. Most Significant Change

The assessment of Most Significant Change has resulted in changes in the structure of the theoretical framework and the Outcome and Impact themes to be assessed as outlined in Table 10.4.

Table 10. 4: Revisions to the Most Significant Change Theme

Lesson Learned/Reflection	Component of framework affected	Revisions to be made/Action
	Most Significant Change	
1. The assessment of Most Significant Change (MSC) yields results that can be categorised as part of Strategic Value, Empowerment and/or Livelihoods	Most Significant Change and Structure of the Outcome and Impact component of the framework	The Most Significant Change is removed as a key theme. Consider the most significant change that takes place as an essential method. Results obtained can then be categorised as part of Strategic Value, Empowerment and Livelihoods.
2. Most Significant Change creates opportunity for unintended outcomes/impacts to emerge	Outcome and Impact themes	Consider most significant change as an essential method for identifying unintended project effects.

10.2.2.3. Empowerment

The assessment of Empowerment resulted in changes in the presentation of Outcomes and Impacts as outlined in Table 10.5. The overall assessment of Empowerment was successful and yielded results that relate to the livelihoods of project recipients.

Table 10. 5: Revisions to the Empowerment Theme

Lesson Learned/Reflection	Component of framework affected	Revisions to be made/Action
	Empowerment	
1. Outcomes and impacts should not be kept in isolation from each other	Empowerment	The identification of Impacts links directly to Outcomes. Therefore, the evaluator should not expect to identify distinct outcomes and distinct impacts as isolated entitles. The evaluator should expect results to a mesh of outcomes and impacts that will require to be distinguished through the analysis process.

10.2.2.4. Livelihoods

The assessment of Livelihoods was successful and produced no changes overall. However, the relationship between Strategic Value and Livelihoods should be emphasised. Although in the initial theoretical framework there is a relationship between the two themes, a special relationship between the two themes was identified from the analysis in the SLL and the ICT4RED project (Figure 10.6).

Table 10. 6: Revisions to the Livelihoods Theme

Lesson Learned/Reflection	Component of framework affected	Revisions to be made/Action
	Livelihoods	
1. The alignment between project outputs and community goals is important for understanding the types of Livelihood outcomes and impacts experienced by community members	Livelihood	The alignment between project outputs, services and community goals sets the tone for the type of Livelihood outcomes and impacts experienced. Therefore, the evaluator should refer to the Strategic Value identified when analysing Livelihood findings.

10.2.2.5. Sustainability

The assessment of Sustainability resulted in additional aspects that need to be made explicit. The analysis of the SLL and the ICT4RED project identified that the assessment of Sustainability should be a continuous process beyond the development of the Outcome and Impact assessment report, as outlined in Table 10.7.

Table 10. 7: Revisions to the Sustainability Theme

Lesson Learned/ Reflection	Component of framework affected	Revisions to be made/Action
	Sustainability	
1. A follow up discussion to discuss and reflect on the assessment findings is necessary.	Sustainability and Stakeholder Relationships	It is a requirement that project stakeholders discuss and reflect on the evaluation findings in detail and determine the way forward in terms of how to sustain the positive outcomes and impacts and put strategies in place to mitigate negative outcomes and impacts. Hosting a post evaluation workshop is one such way to initiate such a discussion.
2. Low engagement of project recipients, such as project champions, in the management of the project influences their engagement in the sustainability of project outcomes and impacts	Sustainability	Ensure that project recipients are encouraged to make suggestions for sustainability despite their minimal involvement in existing sustainability measures in place

10.2.3. Preceding Domains of Evaluation

The application of Preceding Domains of evaluation in the SLL was successful and informative for the interpretation of Outcome and Impact assessment results. Within the ICT4RED project, access to evaluation data from the project team was beneficial for the completion of the Outcome and Impact assessment. Access to prior evaluation findings is essential for understanding Outcome and Impact findings and informing subsequent and iterative evaluations in the project (Table 10.8).

Table 10. 8: Revisions to the Preceding Domains of Evaluation Component

Lesson Learned/ Reflection	Component of framework affected	Revisions to be made
Preceding Domains of Evaluation		
1. Access to prior evaluation findings are key in providing meaning to Outcome and Impact results	Application of comprehensive evaluation	Although the Outcome and Impact assessment can continue if prior domains of evaluation (as outlined in the RICT-CEF) have not been conducted, the evaluation should be flexible to incorporate any kind of evaluation information available to gain meaning from the Outcome and Impact findings. The ICT4RED project did not conduct all prior evaluations as outlined in the RICT-CEF; however, the researcher referred to the evaluation data that was available. Moreover, preceding domains of evaluation are important as the findings can be used to inform the iterative assessment of different evaluation domains.

10.2.4. The overall structure of the Outcome and Impact Assessment Framework

The overall structure of the framework requires minor changes with reference to themes and evaluation guidelines. Evaluation Guidelines should be emphasised throughout the assessment process and not only in the early stages of the Outcome and Impact assessment. For example, strong Stakeholder Relationships should be maintained throughout the assessment. Therefore, the structure of the theoretical framework should depict equal weighting of evaluation guidelines throughout the assessment of all themes and application of Preceding Domains of Evaluation. Moreover, the lesson learned from Most Significant Change (MSC) results in the removal of MSC as a theme as it will be emphasised as an essential data collection method to elicit data. Findings from the assessment of MSC can be categorised as part of the other themes. Therefore, MSC is an essential method for identifying key changes that have occurred. MSC

can be used along with interviews, participant observations, documentation, surveys etc. The findings can then be incorporated as part of Strategic Value, Empowerment and Livelihoods where appropriate. Figure 10.2 depicts the restructured Outcome and Impact assessment framework.

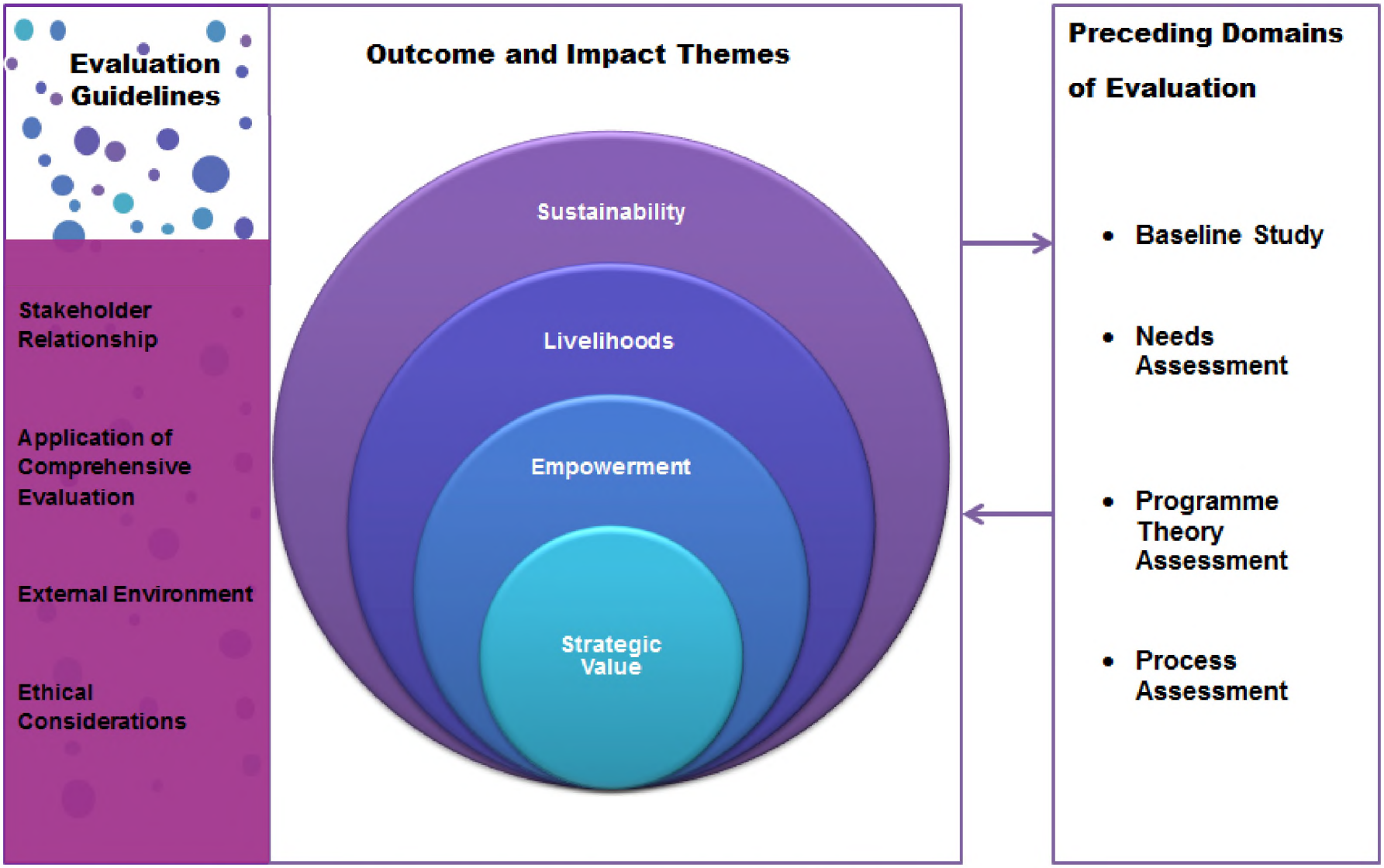


Figure 10. 2: Proposed framework for the outcome and impact assessment of Rural ICT4D

10.2.5. The application of the Outcome and Impact Assessment Framework

The overall application of the Outcome and Impact assessment framework was successful. The application highlighted results that required further in depth analysis, which indicates the need for a comprehensive approach to evaluating for Outcomes and Impacts. The framework guided the researcher on how to conduct the assessment in both the SLL and the ICT4RED project. It highlighted the themes the researcher had to pay attention to, to identify Outcomes and Impacts that demonstrate development. It further provided suggested methods to utilise for the assessment of each theme. The customisation of the theoretical framework to suit both the SLL and the ICT4RED project was satisfactory. Based on the generic framework Evaluation guidelines, the framework variables were suitably contextualised and appropriate aspects of the framework were selected to suit the each project context. Through its application, the lessons learned and experience gained contributed to the revision of the overall framework. In both case studies, the project stakeholders acknowledged the need for such an assessment and the importance for knowing how the ICT4D initiative was performing in favour of facilitating positive change and development in accordance to project aims. Moreover, the application of the framework highlighted revisions that can be incorporated in the RICT-CEF. The identification of Outcomes and Impacts highlighted new needs that project recipients experienced. Therefore, there is a special relationship between the Outcome and Impact domain and the Needs assessment domain. Although there is a direct link from Needs assessment domain to the Outcome and Impact domain, there should be a distinct feedback loop (depicted as dotted lines in Figure 10.3) from the Outcome and Impact domain to the Needs assessment domain. The link highlights the identification of emergent needs as outcomes and impacts unfold. Therefore, the structure of the RICT-CEF should incorporate a new dotted line from the Outcome and Impact domain to the Needs assessment domain.

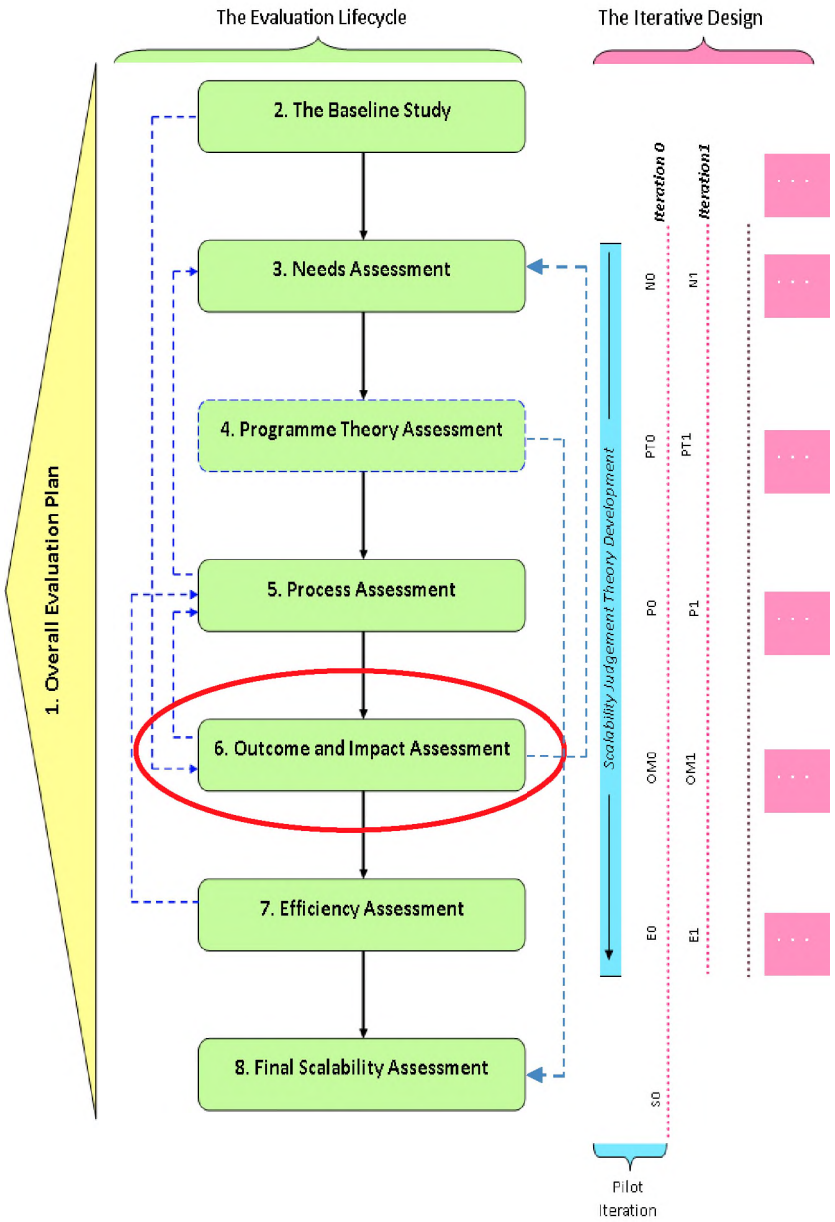


Figure 10. 3: Revision to RICT-CEF

10.3. SUMMARY

The need for Outcome and Impact assessments to undertake a more comprehensive approach to evaluation has led to the development of the proposed Outcome and Impact assessment framework. The assessment framework is structured in a way that acknowledges the various domains of evaluation – Baseline Study, Needs Assessment, Programme Theory Assessment and Process Assessment – that result in a comprehensive approach to evaluation, as outlined from the RICT-CEF. The framework development process required a real life application to determine the suitability of the framework in an ICT4D context. The framework was applied

in the SLL and the ICT4RED project, which resulted in reflections and lessons learned. Reflections and lessons learned paved way for the revision of the framework. The revisions made were primarily to the actual process of assessing the various Outcome and Impact themes, while emphasising certain aspects that were previously undermined in the assessment. Overall, the application of the framework was successful, with changes made to the structure of the framework. The Outcome and Impact themes were changed to reflect the elimination of the Most Significant Change. MSC was reduced to be an essential method throughout the assessment. Moreover, the revised framework emphasises the need to incorporate the Evaluation Guidelines throughout the assessment process. The application of the framework demonstrated its *customisation* to the SLL and the ICT4RED project, which yields lessons learned that can be applied in similar case studies. The overall lessons learned have led to an enhanced Outcome and Impact assessment framework, which should be continuously applied in various ICT4D cases to improve its design and development. Through the continued development and revision of the framework, ICT4D projects can then learn from one another through its continued application.

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Chapter 11: Conclusion and Future Research

11.1. Introduction

11.2. Outline of Thesis

11.3. Research Questions

11.4. Research Contribution

11.4.1. Exploring and applying the Outcome and Impact domain of the RICT-CEF

11.4.2. Contribution to ICT4D Knowledge

11.4.3. Development of the Outcome and Impact Assessment Framework

11.4.4. Contribution to Research Methodology – Design Science in ICT4D

11.5. Implications of the Research

11.6. Limitations

11.7. Future Research

11.7.1. Exploring and applying the proposed framework in other ICT4D cases

11.7.2. Enhancing the theoretical structure of the framework

11.8. In Closing

11.1. INTRODUCTION

Information and Communication Technologies have been implemented worldwide as effective tools for facilitating development. In addition, the assessment of the impacts of ICT4D initiatives has grown attention over the years. Despite the knowledge that impacts assessments are key for project improvement and for the documentation/evidence and demonstration of the effects that ICTs have on development and the evidence that indeed such initiatives are making an impact there lacks work in the area of providing a comprehensive means on evaluating such initiatives over their entire lifecycle. This research sought to propose a comprehensive approach to conducting an outcome and impact assessment as part of the RICT-CEF process. The evaluation of the different stages of a project's lifecycle is important for informing an outcome and impact assessment. Reference to the different domains of evaluation as outlined in the RICT-CEF – Baseline Study, Needs Assessment, Programme Theory Assessment, and Process Assessment – are key to ensuring a comprehensive approach to evaluating for outcomes and impacts takes place. This research proposed an Outcome and Impact Assessment framework that takes into account preceding domains of evaluation following on a comprehensive approach to evaluation. The framework development followed a Design Science approach, which necessitated the utilisation of the framework in a real life context. The framework was implemented as an assessment tool in the SLL and the ICT4RED case studies. In both cases, the framework was used as a guide to assess for outcomes and impacts. The application of the framework in both case studies determined the suitability of the framework in two different ICT4D contexts. The application process was reflected upon and lessons were learned. The lessons learned resulted in the revision and enhancement of the framework for continued implementation in other ICT4D contexts. Changes to the framework overall were minor with emphasis being placed on the Stakeholder Relationships. Moreover, the Most Significant Change theme has been collapsed and instead emphasised as a key method for collecting data. Through the continuous revision and enhancement of the framework the designed artefact (outcome and impact assessment framework) can facilitate the comparison of ICT4D initiatives to improve learning.

The following chapter concludes the research. An outline of the thesis and the research questions addressed in this study are first presented. The research Contribution and Research Implications are then outlined. The chapter concludes with the limitations of the study and suggestions for future work and through the continued enhancement of the Outcome and Impact assessment framework.

11.2. RESEARCH QUESTIONS

This study sought to answer the following research question:

2) **Main Research Question:** *How can an outcome and impact assessment of rural ICT4D initiatives follow a comprehensive approach to evaluation?*

The main research question was addressed in Chapter 9, and Appendices E and G. The Outcome and Impact assessment framework can be applied by addressing all the components of the framework – the proposed evaluation guidelines, the key Outcome and Impact themes, and preceding domains of evaluation.

From the main research question, the following sub-questions were addressed by the study:

> **Research Sub-Question1:** *What are the key Outcome and Impact themes that contribute to a comprehensive approach to evaluating rural ICT4D projects?*

The first research sub-question was informed by an understanding of existing literature from the literature review: Chapters 3-5. The question was addressed by conducting a theoretical analysis of existing impact assessment frameworks in Chapter 6.

> **Research Sub-Question 2:** *What are the key components of an Outcome and Impact Assessment that forms part of a comprehensive approach to rural ICT4D evaluation?*

A theoretical framework was presented in Chapter 7 in response to the second sub-question. Additionally, the proposed framework was evaluated in Chapter 9 through a reflective application of the framework in two ICT4D case studies. Through the reflective exercise, the manner in which the framework can be applied was outlined.The theoretical framework was applied in the SLL initiative (Appendix E) and the ICT4RED initiative (Appendix G) and reflected upon in Chapter 9. The framework was enhanced in Chapter 10 through a review of findings from Chapter 9.

11.3. RESEARCH CONTRIBUTION

The following research contributes to the continued development of the RICT-CEF, the ICT4D body of knowledge, and the development of an Outcome and Impact assessment artefact as follows:

11.3.1. Exploring and applying the Outcome and Impact domain of the RICT-CEF

This study forms part of continued research on the RICT-CEF framework, which aims to provide a comprehensive approach to evaluating ICT4D programmes. The RICT-CEF is characterised by seven domains of evaluation that together render an evaluation comprehensive. As part of the development of the RICT-CEF the first four domains (Baseline Study, Needs Assessment, Programme Theory Assessment and Process Assessment) of evaluation have been applied within a rural ICT4D case. The development and application of the Outcome and Impact assessment framework enhances the RICT-CEF further by exploring the fifth domain (Outcome and Impact domain) and implementing it in two real life case studies. Furthermore, the RICT-CEF (including the Outcome and Impact domain) has been applied in the SLL, providing continued feedback on the value of the project and its effects on the Dwesa community. The Outcome and Impact domain was further applied and explored in the ICT4RED initiative, which provided an opportunity for further enhancement of the Outcome and Impact domain.

11.3.2. Contribution to ICT4D Knowledge

A review of Development programmes, Information Systems/Technology programmes and ICT4D programmes highlighted themes across all three programmes that are necessary to demonstrate development taking place. The themes identified form the basic elements that are considered necessary to demonstrate development through an ICT4D initiative. A template was developed to review impact assessment frameworks across the three programmes to elicit standard Outcome and Impact themes. Nine frameworks were selected, compared and contrasted based on:

1. Aim of project/Issue being addressed
2. Primary outcome and impact assessment themes
3. Secondary outcome and impact assessment themes
4. Context in which impact assessment is taking place
5. Proposed approach to conducting impact assessment or how themes were assessed
6. Methodological approach used – methods and instruments
7. Lessons learned/Limitations discovered.

At the core of ICT4D initiatives is Development and IS/IT, therefore it was considered appropriate to gain insight from both development programmes and IS/IT programmes. Both

programmes have valuable lessons on impact assessments that are applicable to ICT4D initiatives. The selected frameworks highlighted the importance of assessing for the value projects add to communities, whether community members are being empowered to achieve the goals they desire, whether their way of life has been positively altered and whether the development taking place is indeed sustainable.

11.3.3. Development of the Outcome and Impact Assessment Framework

The need for outcome and impact assessments to take on a comprehensive approach to evaluation, based on literature has led to the proposal of an outcome and impact assessment framework that follows on a comprehensive approach to evaluation. The research builds on the RICT-CEF and proposes basic Outcome and Impact themes that guide the assessment of outcomes and impacts. All themes are informed by preceding domains of evaluation as outlined in the RICT-CEF. The basic themes identified from literature include Strategic Value, Empowerment, Livelihoods and Sustainability. Reference to preceding domains of evaluation as outlined by the RICT-CEF is what makes the approach comprehensive. The framework was implemented in two rural ICT4D initiatives to determine its suitability and gain lessons learned for its revision. Through the application of the framework it is revised in terms of its overall structure and process for engaging with stakeholders

11.3.4. Contribution to Research Methodology – Design Science in ICT4D

Design Science was applied in an ICT4D context to develop an evaluation framework that is applicable to real life ICT4D environments. The process followed, drew on Weick's theorizing approach to develop an Outcome and Impact assessment framework (artefact). The theorizing process relied on literature and the researcher's experience in the field. Through Design Science, the artefact was applied iteratively in two rural ICT4D contexts to assess for outcomes and impacts and subsequently revise the framework.

11.4. IMPLICATIONS OF THE RESEARCH

The need for an outcome an impact assessment guided by a comprehensive approach is a way forward in understanding the effects of ICTs on socio-economic development. An outcome and impact assessment that is informed by the Baseline Study, Needs Assessment, Programme Theory Assessment, and Process Assessment Data provides ICT4D evaluators and project stakeholders with meaningful outcome and impact feedback. Having such an approach to outcome and impact assessments ensures that the evaluation process is seen more holistically as part of the ICT4D project as a whole. The proposed framework aims to guide evaluators on

how to assess for outcomes and impacts in ICT4D programmes. Assessing for impacts while only using baseline data (or none at all) as a benchmark can be limiting, in terms of capturing intended, unintended, positive and negative outcomes and impacts. One may miss valuable data; and furthermore, overlook causal links between observed outcomes and impacts, and the ICT4D project.

An outcome and impact assessment that forms part of a comprehensive evaluation approach can encourage evaluators and project teams to reflect on the ICT4D initiative as it develops. It can encourage one to view evaluation as an integral part of the project and not a complete separate entity from other project activities. Evaluators gain meaning by using preceding domains of evaluation as a benchmark for valuing an ICT4D initiative. Moreover, they gain understanding of: how outcomes and impacts relate to emerging needs as a project unfolds; outcomes and impacts with reference to the causal chain of events that have occurred; the required improvements for the programme theory and impact theory of the project; and consequently be in a better position to provide improved ICT services. Furthermore, reflecting on service utilisation; user satisfaction and various use factors (process assessment), in relation to outcomes and impacts, provides more insight into a project's effects. Preceding domains of evaluation further aid the evaluator in contextualising their methods and instruments for identifying outcomes and impact.

As ICTs are known as tools for supporting development, the types of ICT4D outcomes and impacts that should be desired should reflect an improvement in the welfare of people. The proposed outcome and impact themes take into account development topics (empowerment and livelihoods), which are areas that are likely to continue to need attention as noted in the post 2015 development agenda (Heeks, 2014). The outcome and impact themes also draw an evaluator's attention to ways in which the identified outcomes and impacts are sustained; and ways in which the services delivered by the project are aligned to achieving developmental goals. These proposed themes provide evaluators with a starting point for the aspects to look out for when assessing for outcomes and impacts; and consequently contribute to development.

11.5. LIMITATIONS

The limitations identified within this study include the theoretical analysis of only nine impact assessment frameworks and the application of the proposed framework to only two ICT4D contexts.

Theoretical structure of framework

The theoretical structure of the proposed Outcome and Impact assessment framework could be enhanced through the analysis of more impact assessment frameworks. This study only focused on nine existing Impact assessments. Moreover, only two Impact assessment frameworks from IS/IT programmes and three from development programmes were consulted. Incorporating more studies in the analysis of existing frameworks adds value to the theoretical structure of the proposed framework.

Application of the proposed framework to two ICT4D contexts

The proposed framework was applied in two ICT4D case studies. The application of the framework in two case studies allowed for one iteration evaluating the framework. The application in further ICT4D case studies can confirm findings and further refine the proposed framework through subsequent iterations of its implementation.

Reliance on researchers own reflections

The study relied on the researchers own reflections of the experience of using the framework. Other stakeholder roles and views in assessing the relevance of the framework is beneficial in gaining multiple perspectives on the framework and subsequently enhancing it. One way this is planned to be achieved is through workshops with different project stakeholders from both case studies to gain their insights not only on the outcome and impact results but also on the framework that was used to gain the outcome and impact results.

11.6. FUTURE RESEARCH

11.7.1. Exploring and applying the proposed framework in other ICT4D cases

The framework should be implemented in other ICT4D initiatives as an iterative process for its development and enhancement. The application of the framework in other case studies will yield continuous lessons learned which will be beneficial for the enhancement of the framework. Moreover, the application and continued revisions to the framework will create a platform for conducting comparative studies across multiple case studies, which will continue to lead projects to learn from each other.

11.7.2. Enhancing the theoretical structure of the framework

An analysis of more IS and development studies frameworks can be incorporated in further analysis of Impact frameworks to enhance the theoretical structure of the framework. Only two

IS/IT frameworks were incorporated in the analysis of Impact frameworks. As ICT4D initiatives utilise IS/IT, they can benefit from the evaluation of IS/IT programmes. Incorporating more IS frameworks could strengthen the theoretical founding of the framework. Moreover, the inclusion of how different stakeholders can play a role in assessing the relevance of the framework can inform continued improvement in the structure of the framework.

11.7. IN CLOSING

As ICTs only aid in facilitating the process of development, they themselves are not the panacea for development (Gomez and Pather, 2012; Heeks and Molla, 2009; Kozma, 2005; Toyama, 2011). A comprehensive review of the effect of technology in rural communities is required; for effective learning and continued development. Existing outcome and impact assessment measures draw minimal insight from preceding project evaluation data in a project's lifecycle. This often leads to partial learning taking place and identifying results that are isolated from the 'big picture' effects of ICTs on the particular rural development context. An Outcome and Impact assessment that is linked to a comprehensive approach to evaluation provides meaning to outcome and impact results and creates an environment for rich findings to emerge. The enhanced learning from such an approach to outcome and impact assessments holds the potential to inform the scalability and sustainability of ICT4D initiatives in rural areas. As part of the continued framework design, the Outcome and Impact Assessment framework should be applied and explored in on-going evaluation research, and evaluated in real life rural case studies. Such an application would further the development of Outcome and Impact assessment theory in an empirical setting.

References

1. Adam, L., & Wood, F. (1999). An investigation of the impact of information and communication technologies in sub-Saharan Africa. Doi:10.1177/016555159902500407.

2. Ahsan, A. & Raihan, A. 2013. Understanding Health Impact among Aponjon (MAMA Bangladesh) Subscribers through a Phone Survey in Bangladesh. In: *Proceedings of the Sixth International Conference on Information and Communications Technologies and Development (ICTD'13): Notes*. Cape Town, South Africa, 7-12 December 2013. New York: ACM. http://dx.doi.org/10.1145/2517899.2517920

3. Alampay, E. (2006). Analysing socio-demographic differences in the access and use of ICTs in the Philippines using the capability approach. *Electronic Journal of Information Systems in Developing Countries*, 27(5), 1-39.

4. Ali, M., & Bailur, S. (2007). The Challenge of Sustainability in ICT4D – Is Bricolage the answer? *Proceedings of the 9th International Conference on Social Implications of Computers in Developing Countries*. May 2007, Sao Paulo, Brazil. [Online] Available at: http://www.ifipwg94.org.br/fullpapers/R0010-2.pdf. [Accessed 26 March 2012].

5. Alkin, M.C. (2012). *Evaluation Roots: A Wider Perspective of Theorists' Views and Influences* (2nd ed.). New York: Sage Publications.

6. Alkire, S., & Santos, E. (2010). Acute multidimensional poverty: A new index for developing countries. Working paper No. 38. Oxford Poverty and Human Development Initiative. Oxford University. Available at: http://www.ophi.org.uk/wp-content/uploads/ophi-wp38.pdf. [Accessed 5 August 2012].

7. Alkire, S. (2010). Human Development: Definitions, Critiques, and Related Concepts. United Nations Development Programme. *Human Development Research Paper.* [Online]. Available at: http://hdr.undp.org/en/reports/global/hdr2010/papers/HDRP_2010_01.pdf. [Accessed 5 August 2012].

8. Alsop, R., Bertelsen, M.F., & Holland, J. (2006). Empowerment in Practice: From analysis to implementation. The World Bank. Directions in Development. [Online]. Available at: http://siteresources.worldbank.org/INTEMPOWERMENT/Resources/Empowerment_in_Practice.pdf. [Accessed 24 September 2013].

9. Andrade, A.D. (2009). Interpretive Research aiming at theory building: Adopting and adapting the case study design. *Qualitative Report,* 14(1), 42-46.

10. Ashley, C., & Maxwell, S. (2001). Rethinking Rural Development. *Development Policy Review,* 19(4), 395-425. http://dx.doi.org/10.1111/1467-7679.00141

11. Atkinson, R. (2001). The life story interview. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of Interview Research: Context and Method* (pp. 120-140). Thousand Oaks, CA: Sage Publishers. http://dx.doi.org/10.4135/9781412973588.d9

12. Avgerou, C. (1998). How can IT enable economic growth in developing countries? *Information Technology for Development,* 8(1), 15-28.

13. Avgerou, C. (2008). Information Systems in developing countries: a critical research review. *Journal of Information Technology,* 23, pp.133-146

14. Bachmann, U. (2007). Approaches in rural development on the move-a field experience in Nigeria. *Rural Development News* 1.

15. Bailur, S. (2007). Using Stakeholder Theory to Analyse Telecentre Projects. *Information Technologies and International Development,* 3(3), 61-80. http://dx.doi.org/10.1162/itid.2007.3.3.61

16. Balancing Act. (2013). Rescue attempt on poorly performing telecentres in South Africa. http://www.balancingact-africa.com/news/en/issue-no-340/telecoms/rescue-attempt-on-po/en. *Telecoms, Internet and Broadcasting in Africa*. Issue no 340.

17. Bamberger, M., & Mackay, K. (2004). *Monitoring and Evaluation: Some Tools, Methods and Approaches*. Washington, DC: The World Bank.

18. Basden, A. (2009). Ethics of Information Technology. *Ethics in Brief*, 13(6), 1-4.

19. Basballe, D.A. & Halskov, K. (2012). Dynamics of research through design. In Proceedings of the Designing Interactive Systems Conference on – DIS '12 (P.58). New York, New York, USA: ACM Press. Doi: 10.1145/2317956.2317967

20. Baskerville, R.L. & Myers, M. (2004). Special issue on action research in Information Systems: making IS research relevant to practice – foreword. MIS Quarterly, 28(3), 329–335.

21. Batchelor, S., & Norrish, P. (2002). Sustainable Information Communication Technologies (ICT): Sustainability. *Sustainable Initiatives.* [Online]. Available at: http://www.sustainableicts.org/Sustainable.htm [Accessed 13 October 2013].

22. Batchelor, S. & Norrish, P. (2006). *Framework for assessment of ICT pilot projects: Beyond Monitoring and Evaluation to Applied Research*. [pdf]. Information and Development Program, InfoDev. Available at: http://www.infodev.org/infodevfiles/resource/InfodevDocuments_4.pdf. [Accessed 04 April 2012]

23. Batchelor, S., Evangelista, S., Hearn, S., Peirce, M., Sugden, S., & Webb, M. (2003). *ICT for Development: Contributing to the Millennium Development Goals – Lessons Learned from Seventeen infoDev Projects*. Washington, DC: World Bank. Available at: https://openknowledge.worldbank.org/handle/10986/14845 [Accessed 25 October 2013].

24. Best, M. L., & Kumar, R. (2008). Sustainability Failures of Rural Telecenters: Challenges from the Sustainable Access in Rural India (SARI) Project. *Information Technologies and International Development*, 4(4), 31-45.

25. Botha, A., & Verster, M. (2014). *ICT4RED Teacher Professional Development Course. TECH4RED*. Pretoria, South Africa: CSIR Meraka Institute.

26. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology,* 3(2), 77-101. http://dx.doi.org/10.1191/1478088706qp063oa

27. Breytenbach J., De Villiers. & Jordaan, M. (2012). Communities in control of their own integrated technology development processes. *Information Technology for Development,* 19(2), p.133-150

28. Brundtland, G. (1987). *United Nations World Commission on Environment and Development: Our Common Future*. Oxford: Oxford University Press.

29. Brunet, P., Tiemtore, O., & Vettraino-Soulard, M.C. (2004). *Ethics and the Internet in West Africa: toward an ethical model of integration*. Ottawa, CA: IDRC.

30. Brydon, L. (2006). Ethical Practices in Doing Development Research. In: V. Desai & R. Potter (eds.), *Doing Development Research.* London: Sage Publications. pp. 25-33.

31. Brydon-Miller, M., Greenwood, D., & Maguire, P. (2003). Why action research? *Action Research,* 1(1), 9-28. http://dx.doi.org/10.1177/14767503030011002

32. Capurro, R. (2008). Information ethics for and from Africa. *Journal of the American Society for Information Science and Technology,* 59(7), 1162-1170. http://dx.doi.org/10.1002/asi.20850

33. Chambers, R., & Conway, G.R. (1991). Sustainable rural livelihoods; practical concepts for the 21st century. IDS discussion paper 296. December. [Online]. Available at: http://www.ids.ac.uk/files/Dp296.pdf [Accessed 09 October 2013].

34. Clark, D.A. (2005). *The Capability Approach: Its Development, Critiques and Recent Advances*. Global Poverty Research Group. Available at: http://www.gprg.org/pubs/workingpapers/pdfs/gprg-wps-032.pdf. [Accessed 5 August 2012].

35. Clemens, M.A., & Demombynes, G. (2010). When does rigorous impact evaluation make a difference? The case of the Millennium Villages. Working Paper 225. *Centre for Global Development.* [Online]. Available at: http://www.cgdev.org/files/1424496_file_Clemens_Demombynes_Evaluation_FINAL.pdf. [Accessed 25 January 2010]. 10.1596/1813-9450-5477.

36. Cole, R., Purao, S., Rossi, M. & Sein, M.K. (2005). Being proactive: Where action research meets design research. In Proceedings of the 26th International Conference on Information Systems. Paper 27. Las Vegas, 325-336. [Online] Available at: http://aisel.aisnet.org/icis2005/27/. [Accessed 15 August 2016].

37. Corbett, S. (2008). Can the cellphone help end global poverty, *The New York Times.* [Online]. Available at: http://www.nytimes.com/2008/04/13/magazine/13anthropology-t.html. [Accessed1 May 2011].

38. Creswell, J. (2003). *Research Design: Qualitative, quantitative, and mixed method approaches*. Thousand Oaks, California: Sage Publications.

39. Creswell, J.W. (2007). *Qualitative Inquiry and Research Design: Choosing Among Five Traditions*. Thousand Oaks, CA: Sage Publications.

40. De Beer, F., & Marais, M. (2005). Rural communities, the natural environment and development-some challenges, some successes. *Community Development Journal: An International Forum,* 40(1), 50-61. http://dx.doi.org/10.1093/cdj/bsi006

41. DeLone, W.L., & McLean, E.R. (2003). The DeLone and McLean Model of Information Systems success: A Ten-Year Update. *Journal of Management Information Systems,* 19(4), 9-30.

42. Department for International Development (DFID). (1999). *Sustainable Livelihood Guidance Sheet Section 2, DFID, London* [Online]. Available at: http://www.livelihoods.org/info/guidance_sheets_pdfs/section2.pdf [Accessed 19 March 2012].

43. Department for International Development (DFID). (2005). *Monitoring and Evaluating Information and* Communication for Development (ICD) Programmes: Guidelines. Information and Communication for Development. [Online]. Available at: http://webarchive.nationalarchives.gov.uk//http://www.dfid.gov.uk/pubs/files/icd-guidelines.pdf [Accessed 19 March 2012].

44. Dey, B.L., Newman, D.R., & Prendergast, R. (2010). Ethnographic Approach to User-Centred Evaluation of Telecentres. *International Journal of Innovation in the Digital Economy,* 1(3), 22-39. http://dx.doi.org/10.4018/jide.2010070102

45. Diaz-Puente, J.M., Montero, A.C., & de los Rios Carmenado, I. (2007). Empowering communities through evaluation: Some lessons from rural Spain. *Community Development Journal: An International Forum,* 44(1), 53-67. http://dx.doi.org/10.1093/cdj/bsm008

46. Duncombe, R. (2006). Using the livelihoods framework to analyse ICT applications for poverty reduction through microenterprise, *Information Technologies and International Development*, 3(3), 81-100. [Online] Available: http://www.mitpressjournals.org/toc/itid/3/3. [Accessed 26 March 2012].

47. Ei Chew, H., Ilavarasan, V., & Levy, M. (2013). When There's a Will, There Might be a Way: The Economic Impact of Mobile Phones and Entrepreneurial Motivation on Female-owned Microenterprises. In *Proceedings of the Sixth International Conference on Information and Communication Technologies and Development(ICTD '13): Full Papers*. Cape Town, South

Africa, 7-12 December 2013. New York: ACM. doi:http://dx.doi.org/10.1145/2516604.2516605

48. Epstein, T.S., & Jezeph, D. (2001). Development – There is another way: A rural-urban partnership development paradigm. *World Development,* 29(8), 1443-1454. http://dx.doi.org/10.1016/S0305-750X(01)00046-8
49. Etta, F.E., & Parvyn-Wamahiu, S. (2003). Joining the Information Society. *Information and Communications Technologies for Development in Africa,* 2, 1-10.
50. Figueroa, M.E., Kincaid, D.L., Rani, M., & Lewis, G. (2002). Communication for Social Change: An Integrated Model for Measuring the Process and Its Outcomes, CFSC Working Paper no.1, Communication for Social Change, South Orange, NJ. [Online]. Available at: http://www.communicationforsocialchange.org/pdf/socialchange.pdf [Accessed 19 March 2012].
51. Flora, C.B. (1996). Measuring Rural Development: Why not just count jobs? *Rural Development News,* 20(1) (July), 1-2.
52. Floridi, L. (2010). *Information and Computer Ethics*. New York: Cambridge University Press.
53. Ford, M., Botha, A., & Herselman, M. (2014). *ICT4RED-12 Component implementation framework: A conceptual framework for integrating mobile technology into resource-constrained rural school.* In: *IST Africa 2014 Proceedings*. Mauritius, 6-9 May 2014. 10.1109/ISTAFRICA.2014.6880597.
54. Fosu, K.A., & Mwabu, G. 2010. Human Development in Africa. United Nations Development Programme. Human Development Reports, Research Paper 8. Available at: http://hdr.undp.org/sites/default/files/hdrp_2010_08.pdf. [Accessed 5 August 2012].
55. Fraser, C. (1997). Rural economies and ITCs: The Network 2000 project. Local Economy, 12(1), 79-81. http://dx.doi.org/10.1080/02690949708726371
56. Fuchs, R. (2013). From Heresy to Orthodoxy: ICT4D at IDRC In: Ed L. Elder, H.Emdon, R. Fuchs, B. Petrazzini. *Connecting ICTs to Development*. The IDRC Experience. New York: Anthem Press. pp. 1-19.
57. Gabriel, T. (1991). *The human factor in rural development*. London: Belhaven Press.
58. Gasper, D. (2004). *The ethics of development: From economism to human development*. Edinburgh: Edinburgh University Press.
59. Gasper, D. (2009). Development ethics and human development. *Human Development Report Networks,* Issue 24. Available at: http://hdr.undp.org/en/nhdr/support/insights/2009-01/ [Accessed 25 September 2011].
60. Gigler, B. (2015). *Development as Freedom in a Digital Age. Experience of the Rural Poor in Bolivia*. Washington: World Bank Group. http://dx.doi.org/10.1596/978-1-4648-0420-5

61. Gigler, B.S. (2004). Including the excluded: can ICTs empower poor communities? Towards an alternative evaluation framework based on the capability approach. *4th International Conference on the Capability Approach*. University of Pavia, Italy, September 5-7, University of Pavia.

62. Gomez, R., & Pather, S. (2012). ICT Evaluation: Are we asking the right questions? *The Electronic Journal on Information Systems in Developing Countries,* 50(5), 1-14.

63. Gomez, R., Reed, P., & Chae, H.Y. (2013). Assessment of Community Wellness Outcomes to measure ICT impact. Work in Progress, in *Proceedings of ICTD 2013*, Cape Town, South Africa, December 2013. 10.1145/2517899.2517907.

64. Gorniak-Kocikowska, K. (2006). From computer ethics to the ethics of global ICT society. *Library Hi Tech,* 25(1), 47-57.

65. Gregor, S. (2006). The nature of theory in Information Systems. *Management Information Systems Quarterly,* 30(3), 611-642.

66. Gregor, S. & Hevner, A. (2013). Positioning and presenting Design Science research for maximum impact. MIS Quarterly, 37(2): 337-355.

67. Grunfeld, H. (2007). Framework for evaluating contributions of ICT to capabilities, empowerment and sustainability in disadvantaged communities. Indian Institute of Technology (IIT), *Paper presented at the CPRSouth2 (Communication Policy Research) Conference, 'Empowering rural communities through ICT policy and research',* December 15-17, Madras, Chennai.

68. Guitton, C. (2011). *ICTs for Development: Opportunities and Challenges.* Master's thesis, Geneva School of Diplomacy and International Relations, Geneva.

69. Hallikainen, P., & Chen, L. (2005). A holistic framework on Information Systems evaluation with a case analysis. *The Electronic Journal Information Systems Evaluation,* 9(2), 57-64.

70. Hamel, J. (2010). *ICT4D and the human development and capabilities approach: the potentials of information and communication technology.* Published in: Human Development Research Paper Series (HDRP), Vol. 37 (2010), 1-77. [Online] Available at: http://mpra.ub.uni-muenchen.de/25561/. [Accessed 26 March 2012].

71. Hassan, A., & Ghanbari, A. (2010). *Issues and Challenges of New ICT for Development. Information and Communication Technology*. Saarbrücken: Lap Lambert Academic Publishing.

72. Heeks, R. (1999). Information and Communication Technologies, Poverty and Development. Development Informatics. Working Paper Series. Manchester: Institute for Development Policy and Management.

73. Heeks, R. (2002). I-development not e-development: Special issue on ICTs and development. *Journal of International Development,* 14(1), 1-11. http://dx.doi.org/10.1002/jid.861

74. Heeks, R. (2005). Foundation of ICTs in development: The information chain. eDevelopment Briefing, 3(1), 1-2.

75. Heeks, R. (2009). The ICT4D 2.0 Manifesto: Where Next for ICTs and International Development? Manchester Centre for Development Informatics Working Paper 42. Development Informatics Group University of Manchester, UK.

76. Heeks, R., & Molla, A. (2009). *Impact Assessment of ICT- for-Development Projects: A Compendium of Approaches.* Manchester Development Informatics Group, Working Paper, 36. Manchester.

77. Henry, G. T., & Mark, M.M. (2003). Beyond use: Understanding evaluation's influence on attitudes and actions. *The American Journal of Evaluation,* 24(3), 293-314. http://dx.doi.org/10.1177/109821400302400302

78. Herrero, C., Martinez, R., & Villar, A. 2010. Improving Measurement of Human Development. United Nations Development Programme. Human Development Reports, Research Paper 12. Available at: http://econ.univie.ac.at/fileadmin/user_upload/proj_econ/SeminarPapers/WS_2010/herrero.pdf. [Accessed 5 August 2015].

79. 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: CSIR Meraka.

80. Hevner, A.R. (2007). A Three Cycle View of Design Science Research. *Scandinavian Journal of Information Systems*, 19(2), Article 4. Available at: http://aisel.aisnet.org/sjis/vol19/iss2/4. [Accessed 18 January 2016].

81. Hevner, A.R., & Chatterjee, S. (2010). *Design Research in Information Systems: Theory and Practice*. New York: Springer. http://dx.doi.org/10.1007/978-1-4419-5653-8

82. Hevner, A.R., March, S.T., & Park, J. (2004). Design Science Research in Information Systems Research. *Management Information Systems Quarterly,* 28(1), 75-105.

83. Hilty, M., & Hercheui, D.M. (2010). ICT and Sustainable Development. *International Federation for Information Processing, 20-23 September, Queensland, Australia:* 227-235.

84. Hollow, D. (2010). Evaluating ICT for education in Africa. Doctoral Thesis, University of London.

85. Hoq, K.M.G. (2012). Role of information for rural development in Bangladesh: A sector-wise review. *Information Development,* 28(1), 13-21. http://dx.doi.org/10.1177/0266666911417642

86. Hosman, L., & Fife, E. (2008). Improving the prospects for sustainable ICT projects in the developing world. *International Journal of Media and Cultural Politics,* 4(1), 51-69. http://dx.doi.org/10.1386/macp.4.1.51_1

87. Howitt, R. (2011). *Theoretical Foundations.* In: Vanclay, F. & Esteves, A.E. (eds.), *New Directions in Social Impact Assessment: Conceptual and Methodological Advances*. Cheltenham: Edward Elgar Publishing Limited, pp. 3-19. 10.4337/9781781001196.00016.

88. Huggins, R., & Izushi, H. (2001). The Digital Divide and ICT Learning in Rural Communities: Examples of Good Practice Service Delivery. *Local Economy,* 17(2), 111-122. http://dx.doi.org/10.1080/02690940210129870

89. International Development Research Centre (IDRC). (2005). Learning from IDRC-Supported Rural ICT Projects in Asia. International Development Research Centre. [Online]. Available at: http://web.idrc.ca/en/ev-67344-201-1-DO_TOPIC.html

90. International Fund for Agricultural Development (IFAD). (2010). *Rural Poverty Report 2001: the challenge of ending rural poverty*. Oxford: Oxford University Press for (IFAD).

91. Islam, M., & Grönlund, A. (2012). Applying Design Science Approach in ICT4D Research: Mobile Phone based Agricultural Market Information Service (AMIS) in Bangladesh. In: H. Markus, and B. Donnellan, eds. 2011. *Practical Aspects of Design Science: European Design Science Symposium, EDSS 2011, Revised Selected Papers.* Berlin, Heidelberg: Springer. pp. 132-143.

92. Iivari, J. & Venable, J.R. (2009). Action research and design science research - Seemingly similar but decisively dissimilar. In Proceedings to the 17th European Conference on Information Systems, Verona. Paper 73. [Online] Available at: http://aisel.aisnet.org/ecis2009/73. [Accessed 15 August 2016]. Järvinen, P. (2007). Action research is similar to design science. Quality & Quantity, 41(1), 37-54. doi:10.1007/s11135-005-5427-1.

93. Johansson, R. (2003). Case Study Methodology. In: *Royal Institute of Technology, International Conference "Methodologies in Housing Research"*. [Key note speech]. Stockholm, 22-24 September.

94. Kawulich, B. (2005). Participant Observation as a Data Collection Method. *Forum: Qualitative Social Research (FQS).* 6(2), Article 43, [Online]. Available at: http://www.qualitative-research.net/index.php/fqs/article/view/466/996L [Accessed 30 October 2013].

95. Kelles-Viitanen, A. (2005). New Challenges and Opportunities for Rural Development. Paper presented at the IFAD Workshop: *What are Innovation Challenges for Rural Development*, 15-17 November, Rome.

96. Keuchler, B. & Vaishnavi, V. (2008). Theory development in Design Science Research: Anatomy of a Research Project. European Journal of Information Systems, 17(5), 489-504.

97. Khene, C. (2010). The Development and Implementation of an Evaluation Framework for Rural ICT Projects in Developing Countries: An Exploration of the Siyakhula Living Lab, South Africa. Phd Thesis, Rhodes University, Grahmstown, South Africa.

98. Kozma, R.B. (2005). Monitoring and Evaluation of ICT for Education Impact: A Review. In: D.A. Wagner, B. Day, T. James, R.B Kozma, J. Miller & T. Unwin (eds.), *Monitoring and Evaluation of ICT in Education Projects. A Handbook for Developing Countries* (pp. 11-18).

Washington, DC: infoDev/World Bank. Available at: http://www.infodev.org/en/Publication.9.html. [Accessed 24 March 2012].

99. Kozma, R.B., & Wagner, D.A. (2005). Core Indicators for Monitoring and Evaluation Studies for ICT for Education. In: D.A. Wagner, B. Day, T. James, R.B. Kozma, J. Miller, & T. Unwin (eds.), *Monitoring and Evaluation of ICT in Education Projects. A Handbook for Developing Countries* (pp. 21-31). Washington, DC: infoDev/World Bank. Available at: http://www.infodev.org/en/Publication.9.html. [Accessed 24 March 2012].
100. Krauss, K. (2009). Ethical research practice for community entry: Using ICT4D in a deep rural context. In *3rd International IDIA Development Informatics Conference*, Kruger National Park, South Africa, 28-30 October 2009. pp. 246-262.
101. Kreber, C., Brook, P., & Educational Policy. (2001). Impact evaluation of educational development programmes. *The International Journal for Academic Development,* 6(2), 96-108. http://dx.doi.org/10.1080/13601440110090749.
102. Kumar, R., & Best, M. (2006). Social impact and diffusion of telecentre use. [Accessed 28 March 2013]. *Journal of Community Informatics*, 2(3). Available at: http://ci-journal.net/index.php/ciej/article/view/328/267
103. Linnan, L., & Steckler, A. (2002). Process Evaluation for Public Health Interventions and Research: An Overview. In Steckler, A., & Linnan, L. (eds.), *Process Evaluation for Public Health Interventions and Research* (pp. 1-23). San Francisco: Jossey-Bass.
104. Livingstone, S., & Helsper, E. (2007). Gradations in digital inclusion: Children, young people and the digital divide. *New Media & Society,* 9(4), 671-696. http://dx.doi.org/10.1177/1461444807080335
105. Mansell, R. (1999). Information and communication technologies for development: Assessing the potential and the risks. *Telecommunications Policy*, 23(1), 35–50. http://dx.doi.org/10.1016/S0308-5961(98)00074-3
106. Mansell, R. (2004). ICTs for Development: What Prospects and Problems? Department of Media and Communications, London School of Economics and Political Science. *South African Journal of Information and Communication*, 5, 1-22.
107. Marathe, M., O'Neill, J., Pain, P., & Thies, W. 2015. Revisiting CGNet Swara and its impact in rural India. In: *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development (ICTD '15)*. Singapore, 15-18 May 2015. New York: ACM. doi:10.1145/2737856.2738026.
108. Markey, S., Connelly, S., & Roseland, M. (2010). Back of the envelope: Pragmatic planning for sustainable rural community development. *Planning Practice and Research,* 25(1), 1-23. http://dx.doi.org/10.1080/02697451003625356

109. Mason, O. (1995). Applying ethics to Information Technology issues. *Communications of the ACM,* 38(12), 55-57. http://dx.doi.org/10.1145/219663.219681

110. Matodzi, T. (2006). *Implementation of e-learning in rural communities in South Africa.* Master's thesis, Tshwane University of Technology, Pretoria, South Africa.

111. Maxwell, S. 1999. The meaning and measurement of poverty. ODI Poverty Briefing, 3 February. London: ODI. Available at: http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/3095.pdf. [Accessed 5 August 2012].

112. Maxwell, S., Urey, I., & Ashley, C. (2001). Emerging Issues in Rural Development: An Issues Paper. *Development Policy Review,* 19(4), 395-426.

113. Mbashe Local Municipality. (2015, February). 2013/2014 Annual Report. Available at: file:///C:/Users/g08m1052/Desktop/Annual%20report.pdf [Accessed 25 September 2015].

114. Mchombu, K. (1995). Impact of information on Rural Development: Background, Methodology, and Progress. In McConnell, P. (ed.), *Making a Difference: Measuring the Impact of Information on Development*. Ottawa: IDRC. [Online], Available at: http://www.idrc.ca/en/ev-9372-201-1-DO_TOPIC.html

115. McNamara, K.S. (2003). Information and communication technologies, poverty and development: learning from experience. A Background Paper for the InfDev Annual Symposium, 9-10 December 2003, Geneva, Switzerland.

116. Melamed, C., Devlin, N., & Appleby. (2012). Valuing development: Could approaches to measuring outcomes in health help make development more accountable. *Overseas Development Institute.* [Online]. Available at: www.odi.org.uk.

117. Meyer, H.W.J. (2005). The nature of information, and the effective use of information in rural development. *Information Research,* 10, 2. [Online]. Available at: http://InformationR.net/ir/10-2/paper214.html [Accessed 3 June 2012].

118. Molla, A. (2000). Downloading or uploading? The Information Economy and Africa's current status. *Information Technology for Development,* 9(3-4), 205-221. http://dx.doi.org/10.1080/02681102.2000.9525333

119. Molla, A., & Al-Jaghoub, S. (2007). Evaluating digital inclusion projects: A livelihood approach. *International Journal of Knowledge and Learning*, 3(6), 592-611. http://dx.doi.org/10.1504/IJKL.2007.016835

120. Mozelius, P., Hansson, H., Kahigi, E., & Ekenberg, L. (2008). Important aspects in ICT4D projects: towards a model for quality assessment. In: *23rd* International Council for Open and Distance Education *(ICDE) World Conference: Open Learning and Distance Education*. Santo Domingo, 24-26 November 2008. Stockholm: ICDE

121. Mthoko, H. L. W. T., & Pade-Khene, C. (2013). Towards a theoretical framework on ethical practice in ICT4D programmes. *Information Development, 29*(1), 36-53. http://dx.doi.org/10.1177/0266666912449456.

122. Myers, M. (2005). Monitoring and Evaluating Information and Communication for Development (ICD) Programmes. http://www.oecd.org/dev/devcom/46388330.pdf.London:DFID

123. Nikolidakis, N. (2006). It's not only about technology – Success factors in ICT4D-projects. ICT4D collective postgraduate symposium, 14-15 September 2006, London. Øgland, P. (2009). Action Research and Design Science Research – More similar than dissimilar. In Proceedings for Norsk konferanse for organisasjoners bruk av informasjonsteknologi, (NOKOBIT 16), Trondheim, Norway, 171-184. [Online] Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.160.4907&rep=rep1&type=pdf. [Accessed 15 August 2016].

124. O'Neil, D. (2002). Assessing community informatics: A review of methodological approaches for evaluating community networks and community technology centers. *Internet Research: Electronic Networking Applications and Policy,* 12(1), 76-102. http://dx.doi.org/10.1108/10662240210415844

125. Ojo, T. (2007). ICTs for development in the sub-Saharan African region: Historical, economical and political context. Paper presented at *The Annual Meeting of the International Communication Association*, Sheraton Hotel, New York.

126. Oxford Poverty and Human Development Initiative. (2011). *Multidimensional Poverty Index-2011: 109 Countries and sub-national regions of 66 countries*. Available at: <http://www.ophi.org.uk/policy/multidimensional-poverty-index/>. [Accessed 25 October 2013

127. Pade, C., Mallinson, B., & Sewry, D. (2008). An Elaboration of Critical Success Factors for Rural ICT Project Sustainability in Developing Countries-Exploring the Dwesa Case. *The Journal of Information Technology Case and Application (JITCAR),* 10(4), pp. 32-55. http://dx.doi.org/10.1080/15228053.2008.10856146. Pade, C., & Sewry, D. (2009). The Practice and Need for Rural ICT for Development Evaluation: An Experience of the Siyakhula Living Lab Baseline Study. 3rd International Development Informatics Association (IDIA) Conference. Digitally Empowering Communities: Learning from Development Informatics Practice. Kruger National Park, South Africa, October 2009.

128. Pade-Khene, C. & Sewry, D. (2011). Proposed Stages of a Rural ICT Comprehensive Evaluation Framework in ICT for Rural Development Projects. In: *Proceedings of the South African Institute for Computer Scientist and Information Technologists (SAICSIT)*. Cape Town, 3-5 October. New York: ACM. doi: 10.1145/2072221.2072269

129. Pade-Khene, C. & Sewry, D. (2011). Towards a Comprehensive Evaluation Framework for ICT for Development Evaluation – An Analysis of Evaluation Frameworks. In: *2nd International*

Conference on Information Management and Evaluation. Toronto, Canada, 27-28 April 2011. New York: Academic Conferences Limited.

130. Pade-Khene, C., Palmer, R., & Kavhai, M. (2010). A Baseline Study of a Dwesa rural community for the Siyakhula Information and Communication Technology for Development project: Understanding the reality on the ground. *Information Development*, 26(4), 265-288. http://dx.doi.org/10.1177/0266666910385374.
131. Papas, N., O'Keefe, R.M. & Seltsikas, P. (2012). The action research vs design science debate: reflections from an intervention in eGovernment. European Journal of Information Systems, 21(2), 147–159. doi:10.1057/ejis.2011.50.
132. Parkinson, S. & Ramírez, R. (2006). Using a sustainable livelihoods approach to assessing the impact of ICTs in development. *Community Informatics*, 2, 3, 116-127. Available at: http://ci-journal.net/index.php/ciej/issue/view/15. [Accessed 26 March 2012].
133. Patton, M.Q. (1997). *Utilization-Focused Evaluation* (4th ed.). Thousand Oaks, CA: Sage Publications.
134. Patton, M.Q. (2013). *Utilization-Focused Evaluation Checklist (U-FE)*. Available at: https://www.wmich.edu/sites/default/files/attachments/u350/2014/UFE_checklist_2013.pdf [Accessed 6 January 2016].
135. Peffers, K., Tuunanen, T., Gengler, C.E., Rossi M., Hui, W., Virtanen, L. & Bragge, J. (2006). The Design Science Research Process: A model for producing and presenting Information Systems Research. *7th International Conference on Design Science Research in Information Systems and Technology* (DESRIST 2006). 24-25 February 2006, Claremont. Berlin, Heidelberg: Springer-Verlag.
136. Pfeffer, J., & Sutton, R.I. (2000). *The Knowing-Doing Gap*. Boston: Harvard Business School Press.
137. Pries-Heje, J, Baskerville, R., & Venable, J.R. (2008). Strategies for Design Science Research Evaluation. *ECIS 2008 Proceedings.* Paper 87. Available at: http://aisel.aisnet.org/ecis2008/87 [Accessed 16 June 2015].
138. Rabaya, K.S. (2009). Economic and Social empowerment of women through Information and Communication Technology: A case study of Palestine. *The Journal of Community Informatics,* 5(3).
139. Ramírez, R. (2011). Participatory monitoring and evaluation of ICTs for Development. In Steyn, J. & Johanson. G. (eds.), *Sustainable Solutions for the Digital Divide: Theory and Perspectives* (pp. 65-85). New York: Information Science Reference. http://dx.doi.org/10.4018/978-1-61520-799-2.ch004
140. Reilly, K., & Gomez, R. (2001). Comparing approaches: Telecentre Evaluation Experiences in Asia and Latin America. *The Electronic Journal on Information System in Developing Countries,* 4(3), 1-17.

141. Reynolds, W.G. (2010). *Ethics in Information Technology* (3rd ed.). Boston, MA: Cengage Learning.

142. Rivera, W.M. (2006). Rural Knowledge and Information Systems for Non-Agricultural Rural Needs. *Journal of Agricultural Education and Extension,* 12(1), 17-23. http://dx.doi.org/10.1080/13892240600740803

143. Rodriguez, P., Nussbaum, M., Lopez, X., & Sepulveda, M. (2010). A monitoring and evaluation scheme for an ICT-Supported Education Program in Schools. *Journal of Educational Technology & Society*, 13(2), 166-179. Available at: http://www.ifets.info/journals/13_2/14.pdf. [Accessed 25 October 2013].

144. Rogers, P., Khagram, S., Bonbright, D., Earl, S., Carden, F., Ofir, Z. & Macpherson, N. (2011). IE4D – Impact Evaluation for Development: Principles for action. Available at: http://www.scalingimpact.net/files/Impact%20Evaluation%20for%20Development%20-%20Principles%20for%20Action.pdf. [Accessed 25 October 2013].

145. Rossi, P.H., Lipsey, M.W. & Freeman, H.E. (2004). *Evaluation: A systematic Approach.* (7th ed). London: Sage Publications.

146. Rural Development. (2010). *Encyclopaedia of geography*. Thousand Oaks, CA: Sage Publications.

147. Rural-Urban Migration. (2010). *Encyclopaedia of Geography*. Thousand Oaks, CA: Sage Publications.

148. Sahlfeld, Miriam. (2007). "How Does ICT Work for Development: A Review of the Challenges and Opportunities."*African Technology Development Forum,* 4(1), 22-36.

149. Schwalbe, K. (2010). *Managing Information Technology Projects*. (6th ed.) Course Technology. Ottawa: Cengage Learning.

150. Sen, A. (1987). *On Ethics and Economics*. Oxford: Blackwell.

151. Shadish, W. R., Cook, T. D., & Leviton, C. L. (1991). *Foundations of Program Evaluation: Theories of Practice*. New York: Sage Publications.

152. Silvius, A.J., Sheombar, A., & Smit, J. (2009). The Partnership Health of ICT Projects in Developing Countries. In: *Proceedings, Pacific Asia Conference on Information Systems (PACIS) 2009*, Paper 17. AISeL. Available at: http://aisel.aisnet.org/pacis2009/17. [Accessed 13 March 2011].

153. Singh, K. (2009). *Rural development: principles, policies and management* (3rd ed.) Thousand Oaks, CA: Sage Publications.

154. Souter, D. (2012). ICTS, the Internet and Sustainability: A discussion paper. *International Institute for Sustainable Development.* May. Available at: www.iisd.org.

155. South African Government Information. (2000). *The Integrated Sustainable Rural Development Strategy* [Online]. Available at: http://www.info.gov.za/otherdocs/2000/isrds.pdf [Accessed 17 November 2000].

156. Statistics South Africa. (2011). Local Municipality – Intsika Yethu. Available at: http://www.statssa.gov.za/?page_id=993&id=intsika-yethu-municipality [Accessed 25 September 2015].

157. Statistics South Africa. (2011). Local Municipality – Mbashe. Available at: http://www.statssa.gov.za/?page_id=993&id=mbhashe-municipality [Accessed 25 September 2015].

158. Tabassum, G., & Yeo, A.W. (2015). Measurement of tangible and intangible impacts of telecentres on rural communities. In *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development (ICTD '15).* 15-18 May 2015, Singapore. New York: ACM. doi:10.1145/2737856.2737882.

159. Tacchi, J., Slater, D. & Lewis, P. (2003). Evaluating community based media initiatives: An ethnographic action research approach. *OURMedia III*, 18 July, Barranquilla, Colombia.

160. The Local Economic Development Publication for South Africa (LEDSa). (2011). *Growing and weaving with ICT: The Siyakhula Living Lab and Reed House Systems. The Local Economic Development Publication for South Africa* (p. 18). August-September.

161. The Siyakhula Living Lab. (2012). The Siyakhula Living Lab: Project Overview. [Online]. Available at: < http://siyakhulall.org/?q=node/42> [Accessed 25 April 2012].

162. The Siyakhula Living Lab. (2014a). The Siyakhula Living Lab & Reed House Systems A concept document for potential contributors. [Online]. Available at: <http://siyakhulall.org/sites/default/files/SiyakhulaLivingLab_ReedHouseSystems.pdf> [Accessed 13 October 2014].

163. The Siyakhula Living Lab. (2014b). The expansion of the Siyakhula Living Lab: a holistic perspective. [Online]. Available at: http://siyakhulall.org/sites/default/files/The%20SLL%20Expansion%20%286%29.pdf. [Accessed 13 October 2014].

164. Thompson, M. (2008). ICT and Development Studies: Towards Development 2.0. *Journal of International Development,* 20(6), 821-835. http://dx.doi.org/10.1002/jid.1498

165. Toyama, K. (2011). Technology as Amplifier in International Development. *Proceedings of the 2011 iConference, Inspiration, Integrity, and Intrepidity*. 8-11 February, New York (pp. 75-82). http://dx.doi.org/10.1145/1940761.1940772

166. Toyama, K. (2015). *Geek Heresy: Rescue Social Change from the Cult of Technology*. New York: Public Affairs.

167. Underwood, H., Sterling, R., and Bennett, J. (2013) .The PartoPen in Practice: Evaluating the Impact of Digital Pen Technology on Maternal Health in Kenya. In: *Proceedings of the Sixth International Conference on Information and Communication Technologies and Development (ICTD '13): Full Papers*. Cape Town, South Africa, 7-12 December 2013. New York: ACM. doi:10.1145/2516604.2516613.

168. United Nations Conference on Trade and Development (UNCTAD). (2011). Measuring the Impacts of Information and Communication for Development. No 3. Available at: http://unctad.org/enDocs/dtlstict2011d1_en.pdf. [Accessed 28 March 2013].

169. Unwin, T. (2009). *ICT4D-Information and Communication Technology for Development*. Cambridge: Cambridge University Press.

170. Venable, R., Pries-Heje, J, & Baskerville, R. (2012). A comprehensive framework for evaluation in design science research. *7th International Conference on Design Science Research in Information Systems and Technology* (DESRIST 2012). Nevada. Berlin, Heidelberg: Springer-Verlag. 10.1007/978-3-642-29863-9_31.

171. Wagner, D.A., Day, B., James, T., Kozma, R.B., Miller, J., & Unwin, T. (2005). *Monitoring and Evaluation of ICT in Education Projects. A Handbook for Developing Countries. Washington, DC: infoDev/World Bank*. [Online]. Available at: http://www.infodev.org/en/Publication.9.html [Accessed 24 March 2012].

172. Walsham, G., & Sahay, S. (2006). Research on Information Systems in Developing Countries: Current Landscape and Future Prospects. *Information Technology for Development*, 12 (1), pp.7-24. DOI: 10.1002/itdj.20020

173. Walsham, G. (2010). ICTs for the Broader Development of India: An Analysis of the Literature. *Electronic Journal of Information Systems in Developing Countries (EJISDC),* 41(4), p.1-20.

174. Walton, M., & Heeks, R. (2011). Can a Process Approach Improve ICT4D Project Success. Development Informatics. Working Paper Series. Manchester Centre for Development Informatics. Working Paper 47.

175. Welman, J. C., & Kruger, S. J. (2001). *Research Methodology* (2nd ed.). Cape Town: Oxford University Press Southern Africa.

176. Wenn, A. (2008). ICTs for Developing Countries-are there Realistic Answers to the Difficult Problems? (Editorial). *Journal of Business Systems. Governance and Ethics,* 2(3), iv-vii.

177. White, H., Killick, T., & Kayizzi-Mugerwa, S. (2001). *African Poverty at the Millennium: Causes, complexities and challenges.* Washington, DC: World Bank Publications.

178. Wieman, A., Gast, L., Hagen, I., & Van Der Krogt, S. (2001). *Monitoring and Evaluation at IICD: An Instrument to Assess Development Impact and Effectiveness.* Report no. 5, April, The Hague: International Institute for Communication and Development (IICD).

179. World Bank Group. (2012). *ICT for Greater Development Impact-Information and Communication Technology.* [Online] World Bank Group Strategy. Available at:

http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/WBG_ICT_Strategy-2012.pdf. [Accessed 11 September 2013].

180. World Bank. (2011). *What is Monitoring and Evaluation (M&E)?* Independent Evaluation Group. [Online]. Available at: http://web.worldbank.org/wbsite/external/extoed/extevacapdev/0,contentMDK:22293310~enableDHL:True~menuPK:4585753~pagePK:64829573~piPK:64829550~theSitePK:4585673,00.html [Accessed 26 March 2012].

181. Yafi, E., Nasser, R., & Tawileh, A. (2015). ICT's impact on youth and local communities in Syria. In *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development (ICTD'15)*. Singapore, 15-18 May 2015. New York: ACM. doi:10.1145/2737856.2737907.

182. Yin, R.K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage Publications.

183. Zaied, A.N. (2008). Strategic planning for e-development in developing countries. *The International Arab Journal of Information Technology,* 5(2), 109-114.

Annexures: Summaries of select impact assessment frameworks for critical analysis

Appendix A: Summary of select frameworks from social programmes

A.1. DFID (1999) Sustainable Livelihood Guidance Sheet Section 2, DFID, London http://www.livelihoods.org/info/guidance_sheets_pdfs/section2.pdf

The livelihoods framework or the sustainable livelihoods (SL) framework stems from the argument that development should take into account the perspectives of the poor and their way of life (DFID, 1999: 1). The SL framework sheds light on the livelihoods of the poor and indicates the main factors that influence livelihoods. The SL framework aids project stakeholders in engaging with the factors that affect the livelihoods of the poor. It also encourages discussion around the importance of these factors and the interactions or relationships between them. The framework does not have a specified starting point; however, it does suggest that with a people-centred mind-set the framework will likely begin with an understanding of people's assets, their goals and the means by which they achieve or plan to achieve those goals (DFID, 1999: 2). The elements from the framework include:

- *Vulnerability context*
  The vulnerability context depicts the external environment and its influence on the lives of people and the assets they possess (DFID, 1999: 1). Trends, shocks and seasonality within the external environment all shape the lives of people. These trends, shocks and seasonality can have a negative and/or positive influence on the livelihoods of people.
- *Assets*
  The livelihood assets represent people's strengths, their assets and the means of converting those strengths and assets into positive outcomes.
  Livelihood assets can be divided into:
  - Human capital
  - Social capital
  - Natural capital
  - Physical capital
  - Financial capital.
- *Structure*
  Structures within the framework represent organisations (both private and public) that manage policies and legislation, deliver services, purchase and trade and perform functions that affect livelihoods.
- *Processes*
  Processes act as the 'software' of the system. They determine the manner in which structures and individuals interact and function.
- *Transforming structures and processes*
  The transforming structures and processes component of the framework represents the institutions, organisations, policies and legislation that influence livelihoods. This component determines access to capital, livelihood strategies and decision making. It also

determines the terms of exchange for different capitals and the returns to livelihood strategies.

- *Strategies*
  Livelihood strategies represent the actions that people take in order to achieve their livelihood goals. Livelihood strategies are founded on people's access to assets and the structures and processes available to transform these assets into outcomes.
- *Outcomes*
  Livelihood outcomes represent the effects of the livelihood strategies that have been followed. The livelihood outcomes depicted in the framework represent categories that may or may not be applicable in all projects. These outcomes require participatory methods for analyses.
  - Increased income
    Increased income represents the economic sustainability of livelihoods. People seek an increase in the economic value they gain from the activities they engage in.
  - Improved well-being
    People value an improvement in their well-being along with an increase of income. A number of factors affect people's well-being including: self-esteem, sense of control and inclusion, physical security, health, access to services, and the reservation of their culture.
  - Reduced vulnerability
    The poor are often faced with challenges due to the "vulnerability context" which forces them to live in adverse conditions. In such cases unsustainable livelihoods is common. Reducing vulnerability and increasing the overall social sustainability of one's livelihood is important.
  - Improved food security
    Hunger and malnutrition are distinct components of poverty. Improved food security is thus important as food security is a core feature of the *vulnerability context*.
  - Increased sustainable use of available natural resources
    Environmental sustainability is an aspect of sustainability. The sustainability of natural resources is not sufficiently covered in other livelihood outcomes; however it is an important feature of sustainable development.

The livelihood outcomes presented do not represent clear-cut solutions to sustainable livelihoods. Some trade-offs may have to take place and not all outcomes are easily measurable. For example, it is rather difficult to determine the value of increased well-being as opposed to increased income. Furthermore, an increase in income may have been achieved through activities that deplete natural resources.

The framework does not provide a solution to these trade-offs and problems. However, it does provide a means to think through these issues and take into account how outcomes affect the other framework components such as strategies. The sustainable livelihood approach supports the idea of people achieving their own livelihood goals. Thus development programmes should evaluate whether such programmes work towards people achieving livelihood goals they desire. Moreover it is important to determine mutual indicators with

particular groups and also take into account the various aims of different groups and the extent such aims are already being achieved (DFID, 1999: 26). In event that aims are not being achieved it could be the result of conflicting goals, more powerful groups or because people do not have the assets to achieve their aims.

A.2. Figueroa, M.E., Kincaid, D.L., Rani, M. & Lewis, G. (2002) Communication for Social Change: An Integrated Model for Measuring the Process and Its Outcomes, CFSC Working Paper no.1, Communication for Social Change, South Orange, NJ http://www.communicationforsocialchange.org/pdf/socialchange.pdf

The "Communication for Social Change" paper provides indicators and questions necessary for assessing seven critical elements for social change and cooperative action within a community. The authors propose an integrated model of communication for social change (IMCFSC) which provides a means for information sharing, collective understanding, agreement and action. The Communication for Social Change model is based on the theory of community dialogue and collective action. The model (Figure A1 below) represents an iterative process for community dialogue and action to bring about social change within a community with the aim of improving health and the welfare of community members (Figueroa, Kincaid, Rani and Lewis, 2002: 5). From this model development of a community can occur through the collective action of community members to solve a common community problem and thus increase the collective capacity of the community and solve future problems (Figueroa, Kincaid, Rani and Lewis, 2002: 7). The Communication for Social Change model recognises that communities are varied and are characterised by a number of heterogeneous groups who do not always have consensus on community issues. As a result disagreements, external constraints and external support structures are incorporated within the model (Figueroa, Kincaid, Rani and Lewis, 2002: 2).

Catalyst

The model begins with some form of catalyst or stimulus which initiates the dialogue process among community members. The catalyst or stimulus may be an external or internal trigger that prompts community dialogue about an issue or community interest which may lead to collective resolution. A solution to a community problem is only likely if and when community dialogue is effective. The model identified five levels of stimuli (Figueroa, Kincaid, Rani and Lewis, 2002: 6):

- Internal stimulus: An example would be community leaders that stimulate members to talk about a common health or social issue such as an increase in diarrhoea cases, or increased crime rates.
- Change agent: a change agent may initiate discussions around the needs of community members to bring about collective action.
- Innovation: an innovation such as a new vaccine or new transport mode may stimulate members to communicate about the adoption of such an innovation.
- Policies: An example would be new policies that require children to complete primary education.

- Technology: the availability of new technology such as farming equipment may initiate discussions on new and improved farming techniques.
- Mass media: An example would be messages created to initiate individual and collective change in behaviour towards achieving a common goal.

Once a catalyst has initiated some form of dialogue it may result in either creating a sense of greater dissatisfaction with an issue, incite conflict among members or lead to cooperative action to resolve the problem at hand.

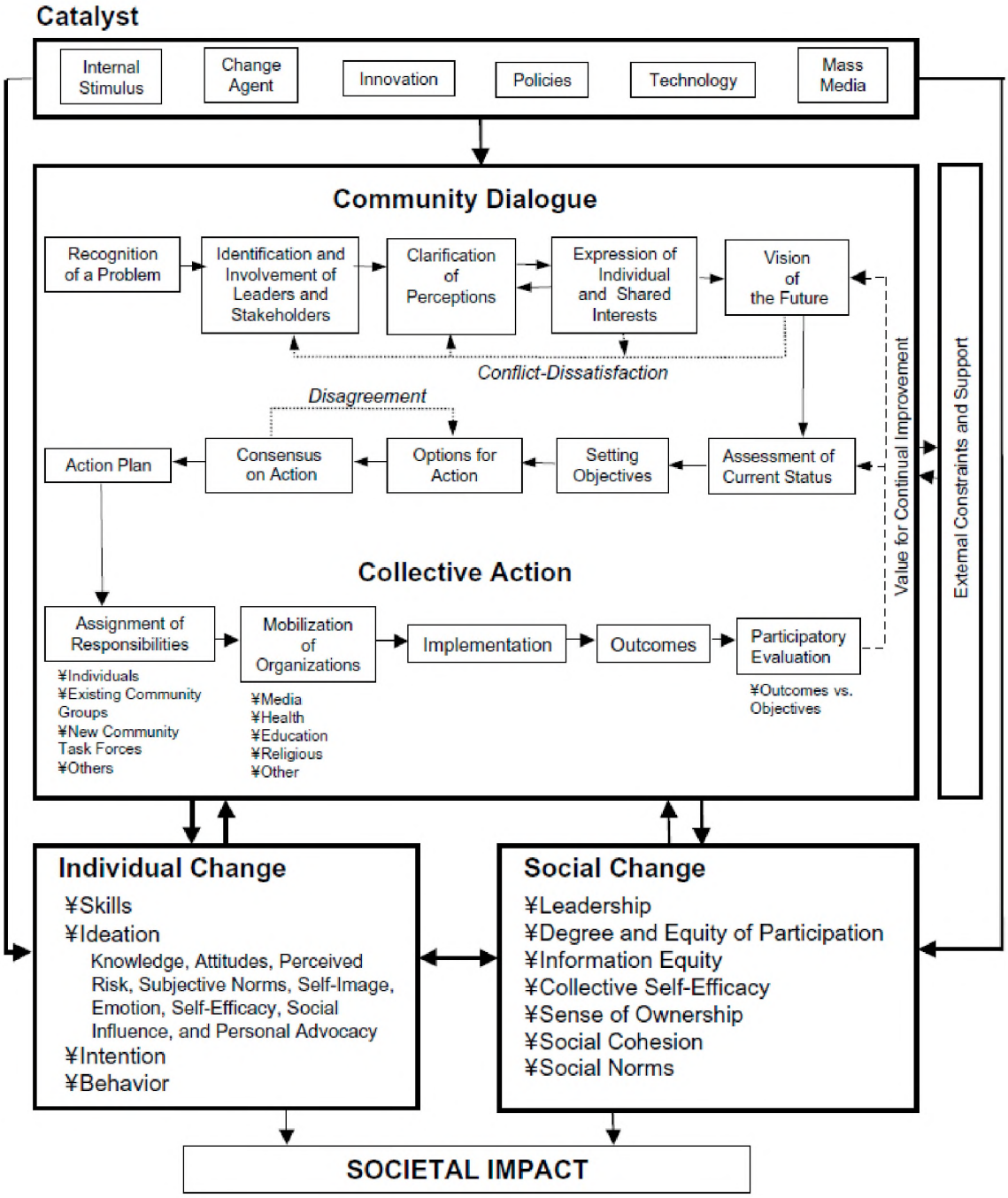


Figure A1: Integrated Model of Communication for Social Change (Figueroa, Kincaid, Rani and Lewis, 2002: 7)

Community dialogue

The community dialogue and collective action components of the model depict the steps that can occur in the communication process. These steps can occur simultaneously to solve a common problem. Depending on the context, some steps might not occur; however in cases where steps are not successfully completed, the initial process can feed back to an earlier step. It is assumed that if the steps are successfully followed, community action is likely to be successful at solving a problem. The community dialogue component entails 10 steps (Figueroa, Kincaid, Rani and Lewis, 2002: 8):

1. Given a catalyst reaction community members should recognise that a problem exist as a result of a catalyst.
2. Leaders and stakeholders should then be recognised for solving the problem.
3. All perceptions about the problem should be clarified. Only once there is consensus on the actual problem at hand, can a collective course of action be identified.
4. Individual and shared needs should all be expressed in order to prevent excluding marginalised groups especially those most affected by the problem. Any conflict that arises should be resolved by community leaders.
5. The vision step signifies where community members see themselves in the future.
6. Community members should then assess the current status of the community and the issue at hand. An understanding of where the community is currently will aid in determining the progress that has been made.
7. Once the current community status is understood, community members should then set objectives on how to tackle the problem as a community.
8. The community would then need to identify resources and the options available for action. If consensus cannot be reached with regards to the course of action to take then the community will have to discuss the objectives and course of action.
9. Once a plan of action is in place, consensus among community members is required. Increased participation and commitment from community members will aid in increased collaborative effort, increased collective efficacy, and increased ownership of the actions being taken.
10. An action plan should then be set with specific deadlines for each action required to resolve the problem at hand.

Collective action

The collective action component of the model describes the process of executing the action plan and the evaluation of the outcomes that result. Five key steps have been identified in the model (Figueroa, Kincaid, Rani and Lewis, 2002: 9).

1. Assignment of responsibilities: community leaders should assign action tasks to community members or volunteers.
2. Mobilisation of organisations: a community may be required to take full responsibility for all assigned task with the help of existing internal and external organisations. For example, health providers and schools may be asked to contribute in health interventions.
3. Implementation: implementation entails executing the action plans and monitoring that process.

4. Outcomes: the outcomes refer to the actual result observed by the community as a result of the action plans carried out. Such outcomes become evident through some process of monitoring.
5. Participation evaluation: a self-evaluation needs to take place, as the original objectives or goals of the community might not align to the outcomes. Community members should participate in the evaluation process in order to share the lessons learned. The results from the evaluation form as feedback for the future visions of the community. Through this process of reassessment, the community gains a sense of collective self-worth. Increased collective self-worth has the potential of reinforcing the value of continual improvement within the community.

External Constraints and support

External constraints and support represents any factors beyond the community's control that influences community dialogue and collective action. Community action itself can also be used to remove such external constraints.

Outcomes

From the diagram the potential individual outcomes of dialogue and collective action include (Figueroa, Kincaid, Rani and Lewis, 2002: 11):

- An improvement in the skills required for a change in behaviour
- Ideational factors as listed in the model
- The intention to engage in new behaviour in the future
- Specific behaviours linked to the problem being addressed.

The social and individual outcomes are the primary focus of the Communication for Social Change model. Given that the dialogue and collective action steps are completed effectively it is expected that meaningful social change will ensue beyond that which is experienced by individual participants in resolving a problem. The community social outcomes and impacts expected include an improvement in community health and (Figueroa, Kincaid, Rani and Lewis, 2002: 12):

- The community's collective self-efficacy and the confidence that as a collective unit they can achieve future community goals.
- The community's sense of ownership of project success.
- The community's will to further cooperate in future projects and their degree of social cohesion.
- The community's social norms and their contribution and sharing of benefits.
- The community's collective capacity to effectively engage in dialogue and collective action.

It should be noted that despite social change taking place within a community, very little impact will result if individual members do not adopt the required changes in their behaviour for effective problem resolution. If neither social change nor a change in individual behaviour takes place then it is expected that the current state of a community will remain as is. Ideally collective action may lead to social change and the required individual change which interact

and result in improvement in the health of the community and other issues faced by the community.

Social change and outcome indicators

From the Communication for Social Change model a number of social outcomes have been identified as briefly discussed above. For each outcome the authors have identified a number of qualitative and quantitative indicators. Therefore depending on the type of evaluator a set of indicators is provided to choose from.

Table A. 1: Social outcomes identified from the Communication for Social Change Model

Indicator	Dimension	Data sources
Leadership	Extent of leadership	▪ Key informant Interviews ▪ Programme records ▪ Focus groups ▪ Household surveys ▪ Representative sample surveys
	Equity and diversity	
	Flexibility	
	Competence in encouraging and securing dialogue and action	
	Vision and innovation	
	Trustworthiness and popularity	
Degree and equity of participation	Access to participation	▪ Key informant interviews ▪ Programme records ▪ Direct observations
	Extent and level of participation	
Information qeuity	Awareness and correct knowledge about the issue	▪ In-depth interviews ▪ Individual representative sample surveys
	Enhanced free flow of information	
Collective self-efficacy	Perceived efficacy to take action	▪ Media ▪ Community leader statements ▪ Key informant interviews ▪ Representative sample surveys
	Perceived capability of other community members	
	Perceived efficacy to resolve issues as a group	
Sense of ownership	Importance of issue to community	▪ Key informant interviews ▪ Sample surveys ▪ Focus groups
	Responsibility for issue	
	Contribution to the programme	
	Perceived benefit from the programme	
	Perceived accountability from the programme results	
	Perceived personal identification with the programme	
Social cohesion	Sense of belonging	▪ Focus group ▪ In-depth interviews ▪ Sample surveys
	Feelings of morale	
	Goal consensus	
	Social trust	
	Social reciprocity	
	Network cohesion	
Social Norms	Norms on participation	
	Norms about leadership	
	Norms about specific issue	

A.3. Mchombu, K. 1995. Impact of Information on Rural Development: Background, Methodology, and Progress, in: *Making a Difference: Measuring the Impact of Information on Development*, P.McConnell (ed.), IDRC, Ottawa.

The impact of information on rural development paper discusses the provision of information for the development of rural communities in Africa and the impact that information may have. The study conducted aimed to explore the impact of information on people's attitudes, skills and knowledge and their attainment of development goals. The paper also explores various methods for the efficient collection and dissemination of indigenous knowledge resources and measures the impact of such knowledge on a community's development.

The paper aimed to identify the impact of information in three southern African countries- Botswana, Malawi, and Tanzania. The impact assessment was taken from the point of view of the individuals themselves rather than the more common quantitative impact measures such as number of users. The research project was conducted in two phases and it setup service centres at six rural communities. A number of information needs where identified in the first phase of the project and then assessed in phase two of the same project. The authors then identified the benefits of information for each need with the aim of relating it to some form of impact assessment. The authors identified the types of services and products that would lead to impacts and the indicators that one would seek for (Mchombu, 1995: 95).

The needs identified from the paper include: income generation, employment, soil conservation measures, information on community leadership, and health information. The data that was collected was in the form of anecdotes from community members. These anecdotes contained information of community member's reactions towards the use of information, the effect of information on work, thinking and development. Interviews also took place with 20-30 respondents from each community. The analysis methods used were content analysis, with the overall aim of tracing the services offered to the needs identified (Mchombu, 1995: 99). Table A2 provides the list of benefits, services and products for each information need identified.

Table A. 2: Information needs and their anticipated benefits

Need	Anticipated benefits	Services and products to provide benefits
Income generation	Find opportunities to earn off-farm incomes	• Information sources of rural finance, how to generate more rural income, how to process and preserve food items, how to start and manage small projects, and how to avoid bankruptcy. • Information on market prices for various agricultural produce and booklets on basic accounting and economics. • How cooperative activities operate.
	Identify opportunities to earn extra income from agricultural products.	
	Learn about small business. Be aware of basic economics and simple accounting procedures.	
	Increase cash income in the household	

Employment	Self-improvement and improved chances of acquiring training and work Awareness of self-employment opportunities	• Information on local job opportunities, newspapers with vacancies. • Information on self-employment opportunities. • Information on course and training schemes, career literature and directories of vocational training institutions.
Soil conservation measures	Improved management of land and water. Improved land use practice Increase in agricultural productivity. Improved soil fertility restoration practices.	• Information on various farming techniques and management practices. • Information on local/government bylaws on conservation. • Use of fertilisers, prices, advantages and problems.
Information on community leadership	Improved leadership in the community. Increased capacity to identify community problems, formulate action and monitor implementation of community solutions. Improvement in the motivation and mobilisation of people for development. Appreciate need for accountability and democratic participation.	• Information on community development and management. • History of community and its development. • News of on-going projects within the village, of government programmes that affect the village and news of other programmes the community can take advantage of.
Health information	Health and disease awareness Improved chances of taking measure against common diseases and attendance at health centres. Improvement in family nutrition and safer handling of pesticides and agricultural drugs.	• Information on common disease and their control measures. • Information on nutritious food that is locally available and information on safe handling of pesticides and what to do in case of poisoning. • News on scheduled clinics for under-fives.

Appendix B: Summary of select frameworks from IS/IT programmes

A.4. DeLone, W.L. and McLean, E.R. 2003. The DeLone and McLean Model of Information Systems success: A Ten-Year Update. *Journal of Management Information Systems,* 19 (4), 9-30.

The original IS Success framework and model was designed to measure the success of information systems. DeLone and McLean (2003) conducted a ten-year review for IS success measurement with the aim of producing an updated D&M IS success model (DeLone and McLean, 2003: 10). They discuss various IS success research that has applied, validated, challenged and enhanced the original IS Success model. From their evaluations, they made minor adjustments to the original model and proposed a new model and how it can be used for measuring e-commerce system success.

Within the D&M IS Success Model (Figure B1) "systems quality" measures the technical success of the systems; that is the accuracy and efficiency of the system. "Information quality" measures the success of the semantics of the system; that is the success at which information conveys its intended meaning. While "use, user satisfaction, individual impacts and organisational impacts" measures the effectiveness success; that is the effect that the information has on the receiver (DeLone and McLean, 2003: 10). These six dimensions of IS success are all interrelated as shown in the diagram. A process understanding drove the original D&M IS Success Model. From a process perspective, an information system is created with specific features that meet particular system and information quality standards. Users and managers who experience a level of user satisfaction or dissatisfaction from the systems or its information products then use this system. The use of the systems and its products then influences the individual users' performance in their work, which results in organisational impacts (DeLone and McLean, 2003: 10). From the original model the authors noted that IS success is multidimensional and thus it is important to understand the interrelationships between the dimensions for success (DeLone and McLean, 2003: 11). The steps in themselves are not sufficient for IS success and impact. For example, without use there will not be any resulting consequences or gains. However, if use is 'inappropriate' even if it is extensive, there will be no resulting benefits. Thus, the context, nature, appropriateness and extent of use need to be considered (DeLone and McLean, 2003: 16). Alternatively, from a causal perspective increased systems quality should lead to an increase in user satisfaction and use which results in positive impacts on the individual users and ultimately an improvement in organisational productivity (DeLone and McLean, 2003: 11).

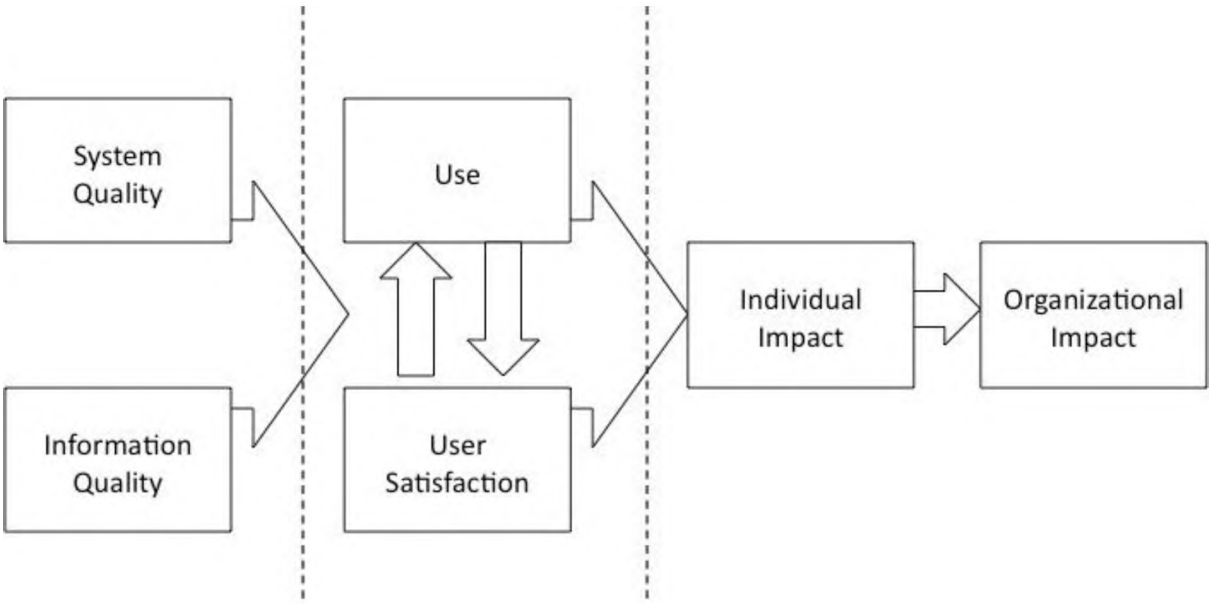


Figure B1: D&M IS Success Model (DeLone and McLean, 2003: 12)

Figure B2 displays the updated D&M Success Model. Within the updated M&D IS Success Model a third dimension, "service quality" has been added and individual impacts and organisational impacts have been combined into a single dimension known as net benefits. The term impact has been replaced as it encompasses both negative and positive impacts. To avoid confusion as to whether the results are good or bad, 'net benefits' is preferred. Furthermore, net benefits encompass the overall results of an Information System, as there is no completely positive outcome without any negative consequences (DeLone and McLean, 2003: 22). The term net benefits also give room for accommodating different contexts and thus different users can define what constitutes a benefit and thus IS success. Therefore, it is important to clearly define the stakeholders and context in which measurement will take place. The updated model shows the associations among dimensions in a process sense. However, it does not show the positive or negative indications in a causal sense as different contexts will result in different causal effects. For example, increased effective use will result in increased satisfaction and positive net benefits. However, increased use of a poor system will result in dissatisfaction and negative net benefits (DeLone and McLean, 2003: 23).

DeLone and McLean (2003) adapted their model to the measurement of e-commerce systems. As the users of e-commerce systems are mainly customers and suppliers who undertake business transactions the updated model is suitable for these processes of communication. Within the updated model the six dimensions measure (DeLone and McLean, 2003: 25):

- System quality
  System quality measures the usability, availability, reliability, adaptability and response time for an e-commerce system.
- Information quality
  Information quality measures the content of the e-commerce application. Content is expected to be complete, relevant, easy to understand, personalised, and secure.
- Service quality
  Service quality entails the support offered by the service provider.

- Usage
  Usage measures everything involved in executing a transaction.
- User satisfaction
  User satisfaction involves the entire customer experience and their opinions throughout their experience.
- Net benefits
  Net benefits are considered the most important measure as they capture both the positive and negatives impacts on users. Net benefits however cannot be measured without taking into account "system quality" and "information quality" measures as well.

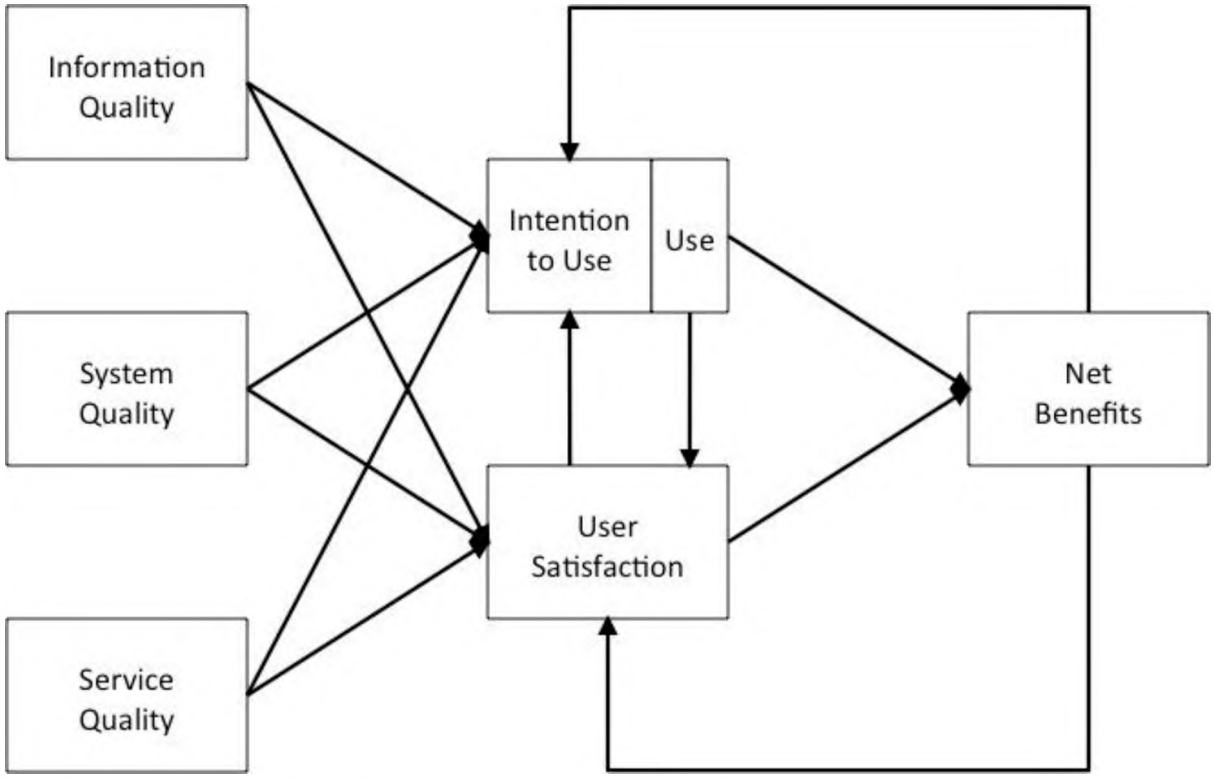


Figure B2: Updated D&M IS Success Model (DeLone and McLean, 2003: 24)

An extract (Table B1) from the DeLone and McLean (2003: 26) paper demonstrates the type of metrics for each of the six dimensions from the updated model that were identified from IS and e-commerce literature. From the table the key impact themes will be drawn from Net benefits as this dimension is the one that demonstrates the overall outcome and impact of e-commerce applications. From net benefits the key themes suggested are: cost savings, time savings and increased productivity and market expansion.

Table B1: Metrics for D&M dimensions for success

	Metrics
Systems quality	Adaptability
	Availability
	Reliability
	Response
	Usability
Information quality	Completeness
	Ease of understanding
	Personalisation
	Relevance
	Security
Service quality	Assurance
	Empathy
	Responsiveness
Use	Nature of use
	Navigation patterns
	Number of sites visited
	Number of transactions executed
User satisfaction	Repeat purchases
	Repeat visits
	User surveys
Net benefit	Cost savings
	Expanded markets
	Incremental additional sales
	Reduced search costs
	Time savings

A.5. Hallikainen, P. and Chen L. 2005. A Holistic Framework on Information Systems Evaluation with a Case Analysis. *The Electronic Journal Information Systems Evaluation,* 9(2), 57-64.

Hallikainen and Chen (2005) introduce a framework for understanding Information Systems evaluation in a more holistic perspective. Their framework presented in Figure B3 incorporates the IS evaluation process into business development and IS development processes. The components of the framework include (Hallikainen and Chen, 2005:58):

- Outset situation
  - *Organisational norms and values*
    The business values, the environment and the characteristics of the investment undertaken all affect the manner in which the evaluation is conducted. Any form of investment incorporates organisational values, goals and business objectives as prerequisites for an investment.
  - *Project contingencies*
    An information system can be created for various reasons within an organisation for example as part of the infrastructure for future applications or for supporting a business activity. The type of investment made will depend on the type of system and how common this system is used within industry.

- *IS project resources*
  Both material and intangible resources are important for developing an information system.

- Business development process
  IS projects are often tied to larger organisational strategies. For example technology may facilitate developing new business, products and or services. IS evaluation would then aim to ensure the IS project delivers the technological capabilities required to achieve business goals.
  - *IS development process*
    Due to the constantly changing business environment it is required that system evaluation is conducted regularly throughout the IS development process. The type of development methodology selected (life-cycle based, iteratively based or mixed method) will affect the manner in which the evaluation is conducted.
  - *IS procurement process*
    The choice of IS procurement influences organisational operations. For every type of IS developed, different resources are required and thus different procurement strategies are required; whether it is outsourced, bought of the shelf or built in house will depend on the type of system required and the organisational objectives.
  - *IS evaluation process*
    The aim of the evaluation process should be to identify the critical areas of the IS project. The evaluation process should be integrated within the business development process, the IS development process and the IS procurement process. Hallikainen and Chen (2005: 60) identified five categories within the IS evaluation process: "strategic value", "risks", "financial profitability", "success of IS development", and "success of IS usefulness". The order in which the categories are depicted is important. The intangible benefits and risk should be evaluated prior to the tangible benefits. Hence the order of the first three categories within the holistic framework on IS evaluation reflects this. IS success is placed prior to IS usefulness as the usefulness can only be truly observed once an IS has been used over a period of time. The evaluation should cover all the above categories. However the focus of evaluation will depend on the evaluators and the goals of the evaluation; thus each category will have a different level of emphasis.
- Outcomes
  From the framework the identified outcomes of an IS project are the success of IS implementation, the success of IS investment and the success of the IS functionality.

The authors conducted a case study in a Finnish company to evaluate how IS evaluation was conducted within the company environment where technology is used on a daily basis. A questionnaire was used for the pilot study that was carried out. The authors carried out semi structured interviews with the IS manager and the project manager as they had extensive knowledge of the project. For the project manager it was important for the evaluation to focus on whether the business itself would be successful and not the actual IS investment alone. From the study the authors were not able to identify the actual effects of the IS investment on the functions of the business. However strategic value was a very important criterion.

Components such as product success, the effects on sales volume, financial productivity i.e. payback period and reduced risks were the more important factors that were assessed. Efficiency of use was not considered critical within this case study. Various challenges within the case study that were discovered include making tacit evaluation knowledge clear for the purpose of improving future projects. Furthermore the evaluation procedure should be better adjusted to the changing business environment.

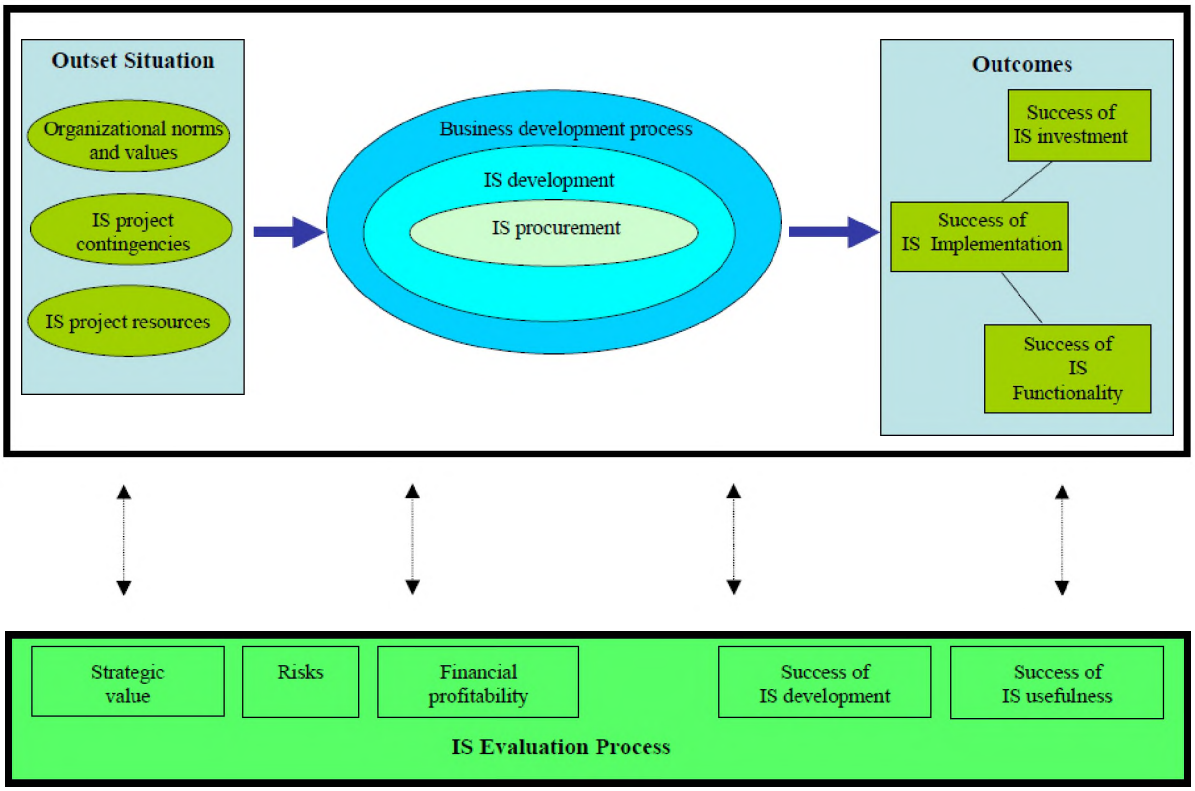


Figure B2: A holistic framework on IS evaluation

Appendix C: Summary of select frameworks from ICT4D programmes

C.1. Batchelor, S. & Norrish, P. (2005) Framework for the Assessment of ICT Pilot Projects.

Batchelor and Norrish (2005: 8) formulated an assessment framework Figure C1 which provides useful guidelines for the assessment of pilot ICT4D initiatives. The assessment framework outlines:

- The need for ICT projects to implement monitoring and evaluation systems that ensure a project fulfils its intended goals. Thus what is the relationship between the outcomes of an ICT intervention and the processes that may lead to achieving development goals (impact).
- The need for ICT projects to incorporate evidence-based research as a means of identifying how the project has contributed towards development and how it can be brought to scale with regards to the future. Thus, what are the conditions required for replicating and expanding the project?

The framework is designed to interpret how pilot projects contribute towards development priorities and how such projects can be brought to scale. The framework treats ICT projects as applied research that aims to fill the knowledge gaps within the ICT4D field and understanding what works and what does not and more importantly understanding ICT4D impact (Batchelor and Norrish, 2005: 15):

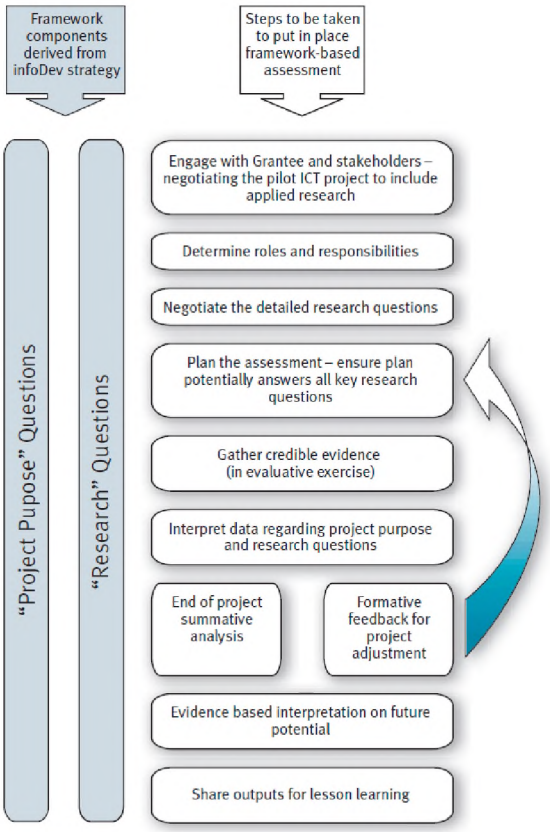


Figure C1: infoDev Framework for the assessment of ICT pilot projects

The first component of the framework identifies the "project purpose". The "project purpose" relates to the aims of the project and whether the project is likely to achieve its purpose as stated in the project plans. Questions related to project outcome and impacts within the first component include (Batchelor and Norrish, 2005: 17):

- What have been the outcomes and impacts of the project both in the short and long term? The pilot project should indicate what the intended and the long term impacts of the project are. The project should also anticipate likely unintended impacts of the project.
- What process took place that led to the outcomes? This area focuses on the internal workings of the project itself. Furthermore, what role have ICTs played in the process that led to the outcomes?
- In what context and conditions did those outcomes take place? It is important to document the context in which the project is implemented in order to determine which factors were necessary for the success of the ICT project.
- Are the project outcomes and impacts sustainable and if so in what conditions can sustainability be ensured?
- Do the project outcomes have unintended impacts on the wider social, economic and environmental front?

The second component of the framework explores the "research questions". This component seeks to identify evidence on how ICT pilot projects might be mainstreamed and replicated and identify their impact on development priorities. The framework presents two important research questions that are directly related to the knowledge gaps identified within the ICT4D arena. The first question aims to identify if there is a relationship between the outcomes of an ICT intervention and the processes that may lead to achieving development goals (Impact). The relationship between the project outcomes and the development goals should be described with reference to actual changes in the social and economic environment. Secondly, what are the conditions required for replicating and scaling the project? Replication aims at testing the research question under a different environment; while scalability aims to replicate the outputs of a particular project over a wider area or to expand to a larger target population (Batchelor and Norrish, 2005: 21).

The third component of the framework outlines the steps suggested for conducting an impact assessment of ICT pilot projects.

- The first stage entails engaging with the grantee and stakeholders to negotiate the required resources for conducting the monitoring and evaluation process. For the negotiations to take place the task manager should have a clear expectation of what the ICT project assessment will entail. The grantee should put in place a system of accountability and learning at project level. During the negotiation process it should also be made clear that the grantee is a willing participant of the assessment.
- The second stage aims to determine the roles and responsibilities of the assessment. The assessment team should be responsible for sharing knowledge gained from the project. They should discuss with the Grantee the research questions and how data and evidence will be gathered.

- The third stage entails determining the research questions that will be addressed and the means and methods required for collecting and analysing the evidence for addressing those research questions.
- The fourth stage entails planning how the research purpose and research questions apply and who will be collecting data and evidence for the ICT intervention.
- The fifth stage involves gathering rigorous evidence on how ICTs impact a community.
- The sixth stage aims to interpret the data gathered making use of both formative and summative analysis. The last stage entails sharing and disseminating assessment outputs for lesson learning (Batchelor and Norrish, 2005: 21).

Throughout the duration of the project, the monitoring and evaluation framework outlined above provides both qualitative and quantitative feedback to project managers who then use it to adjust the ICT project (formative M&E). At the end of the project, project managers and sponsors would then learn from the experience and determine whether the project has met its objective and how it can be improved or replicated (summative M&E). The framework further provides some guidelines as to the approaches and methods that can be followed for impact assessments. Assessments should aim to identify change that has taken place within a project through the perceptions of the people experiencing that change or through the use of control groups to demonstrate impact. The framework emphasises the importance of historical data and understanding the processes and causality that resulted in particular outcomes and ultimately impact. Batchelor and Norrish (2005: 30) pay close attention to four categories (direct livelihoods, enabling environment, uptake/provision of ICTs, service delivery efficiency) of ICT pilot projects and it is within these categories that the above framework suggests important themes and methods for assessment (Batchelor and Norrish, 2005: 30):

- *Direct livelihoods effect – Projects that promote the direct use of ICTs to enhance the livelihoods of the poor*
  Within these projects the assessment should focus on the livelihoods of the poor; for example gaining an understanding of the household assets and the way people access their information and community communication systems. The methods suitable for the suggested assessments would be household surveys and Knowledge, Attitude, Behaviour and Practice (KABP) surveys.
- *Enabling environment-projects that seek to change the enabling environment such as the regulatory environment and awareness among policy makers*
  Within these projects the assessment should focus on the changing behaviour of the recipient community. The methods most suitable for such an assessment would be KABP surveys, Tracer surveys and Delphic surveys. These surveys can be conducted in isolation or can be combined to obtain more comprehensive results. These surveys are most useful when baseline data is made available as they will give an initial indication whether the outcomes and impacts are the result of the change initiative that has taken place.

- *Uptake/provision of ICTs – Projects that aim to encourage the uptake and provision of ICTs*
  Within these projects assessment focuses on ICT capacity building in terms of training community members in the use of specific ICTs and maintaining such ICTs. For such an assessment tracer studies and quantitative data on technology are suitable techniques for assessment.
- *Service delivery efficiency – Projects that aim to enhance the delivery of services (health, education) through the use of new technologies.*
  With service delivery projects the assessment should look at the skills provided through training and any changes that have taken place with regards to services or the delivery of services. Tracer studies and change in practice surveys would be useful for this type of assessment. These methods aim to determine the efficiency, effectiveness, sustainability and relevance of the services being provided.

C.2. Myers, M. (2005) Monitoring and Evaluating Information and Communication for Development (ICD) Programmes.

Myers (2005: 6) introduces a framework for the assessment of communications for development programmes. It differentiates between communication initiatives that can be divided into behaviour change initiatives or social change initiatives. Behaviour change initiatives make use of messages targeted at individuals with the aim of changing people's behaviour about a particular issue; whereas social-change initiatives provide communities with information that aims to inspire them (Myers, 2005: 6). The paper discusses various approaches for assessing the impact of communications projects and also provides some guidelines and methods that can be used during the post-implementation stages of a communication for development programme. The key impact themes identified within the paper focus on assessing the change in behaviour of community members and identifying the most significant change that has come about as a result of the project (Myers, 2005: 6). The paper suggested three approaches for assessing these themes which include experimental impact studies, most significant change and participatory evaluation approaches.

Experimental impact studies include a number of methods such as assessing a community's knowledge and behaviour after a project has been completed without taking into account any baseline data. With such a method, one would require to compare the results to an external standard such as national goals or historical trends. Another method for experimental impact studies would be to compare baseline data to post implementation data and take note of the changes that have taken place within the project. However, an issue with such a method is that there is no indication that the change that has taken place is the direct result of the project. Alternatively, one can compare different control groups whereby one group is exposed to the ICT initiative and the other group is not (Myers, 2005: 22). However, such groups have to match as closely as possible in terms of their characteristics to remove any form of bias. Furthermore, ethical implications also need to be considered. A problem may arise when deciding on the target audience and restricting one group from the intervention,

which may create a sense of alienation with some groups within the overall community. Time series is also another suggested method for experimental impact studies for assessing behaviour and most significant change that has taken place within a community. Time series tracks the community behaviour overtime at a given location.

The most significant change approach seeks to gain understanding from the events that have taken place rather than being based on indicators. This method involves obtaining stories from stakeholders about the major changes they have experienced within the project and then compiling, analysing, and verifying these stories. The benefits of this method is that it identifies unintended outcomes and it aids in identifying why a particular change has occurred (Batchelor and Norrish, 2005: 35; Department of International Development, 2005: 23).

The final approach addressed by Myers is the *participatory evaluation approach*. Within this approach stakeholders measure the programme success using indicators they have set themselves. Some useful participatory methods that have been identified by the authors are discussed below (Batchelor and Norrish, 2005: 26; Department of International Development, 2005: 12; Wieman, Gast, Hagen and Van der Krogt, 2001: 5):

- *Participant observations*
  Participant observations require the researcher to partake in the context under investigation. The researcher has to be accepted as a natural component of the culture they are being immersed in which does take several months or even years. It thus requires the researcher to be immersed in the environment that is being studied.
- *Direct observations*
  Direct observers do not aim to become a participant in the context. Direct observers take on a more detached perspective in order to avoid any bias as much as possible. Direct observations are more focused than participant observations as the observer only observes a particular situation or sample rather than immersing themselves in the entire context. Lastly direct observations are short term as compared to participant observations.
- *Unstructured interviewing*
  Unstructured interviews entail some initial guiding questions; however there is no formal structure. The interviewer may guide the interview in any direction of interest. It is a useful way of exploring a topic. However, unstructured interview data is difficult to analyse due to the uniqueness of each interview and the lack of a set structure of questions.
- *Questionnaires*
  Questionnaires are easy to use, yet they provide a limited amount of information. Thus questionnaires should be a basic tool, and where insufficient information is provided, semi-structured interviews should be used.
- *Focus groups*
  Focus groups form informal guided discussions on a topic of interest, with normally six to ten participants. Such discussions aid in answering 'how' and 'why' questions.

- *Pre-testing*
  Pre-testing is widely used as part of any communication strategy. Pre-testing usually takes place in controlled environments to elicit information on the opinions of the respondents and whether communication has been understood
- *Role-playing and story-telling*
  These methods can be used to elicit and determine how individuals respond to sensitive information/issues that may be best represented through exaggerated expressions of the issue.
- *Keeping logs*
  Documenting experiences and other means of recording feedback is one method that is often overlooked. Records should be kept on every activity for example training events, workshops and any feedback received.
- *Tracer studies*
  Tracer studies involve spreading messages and then asking questions about them. The findings are then compared for control questions (questions whereby no messages were disseminated). This process works only in well controlled environments.
- *Delphic surveys*
  A panel of experts are selected to complete a set of questionnaires which are then analysed and revised. A new set of questionnaires is then distributed taking into account the revised material to reflect the previous responses. This process is repeated until an agreement is reached among the experts. Delphic techniques are used to reflect trends and predict future developments.

C.3. Gigler, B.S. (2004) Including the excluded: can ICTs empower poor communities? Towards an alternative evaluation framework based on the capability approach.

Gigler (2004: 2) introduces an Alternative Evaluation Framework (AEF) that places individuals and their capabilities at the centre of analysis. The framework emphasises the role of knowledge and information flow in the process of expanding human and social capabilities of poor communities. The AEF framework rests on Sen's capability approach as it captures the essence of empowerment as viewed by Gigler (2004: 5). Sen's capability approach further provides the foundations for evaluating development projects from a human development perspective. The primary theme drawn from the AEF is the empowerment of marginalised groups. The aim is to allow community members themselves the opportunity to define development criteria that they consider important. Such criteria can be diverse sustainability livelihood outcomes such as self-esteem, security, happiness, stress, vulnerability, power and exclusions (Gigler, 2004: 7). The framework draws on three key factors that are required for access to ICTs and enable the poor to utilise these ICTs for their own development. The key factors required are:

- Firstly a successful intervention by a local intermediary is needed to ensure meaningful use of ICTs contributes to the livelihoods of the poor.
- Secondly ICTs need to be adopted by the local community in order to facilitate their empowerment. Gigler (2004: 4) emphasises that there is no direct causal relationship

between ICTs and empowerment. Instead there is a complex relationship between people, various institutions and technology.

- Thirdly ICTs have to be anchored on and reinforce existing social and organisational structures.

The AEF differentiates between three types of empowerment. Firstly, individual empowerment focuses on people developing their own self-esteem and enhancing their abilities to achieve and do that which is of value to them. The second level of empowerment draws on community or collective empowerment. It is based on the collective view of power and the importance of community organisations and their involvement in the empowerment process. The third form of empowerment centres on the society as a whole. This level of empowerment draws on social and political change at a more national and international level. It is based on an understanding that the empowerment of the poor will require redistribution of power; including power struggles between the elite and the marginalised groups. Given these different levels of empowerment, this framework draws on the understanding of the psychological aspects of empowerment and the perceptions that poor communities have of themselves and their surrounding society.

The paper makes use of a case study with indigenous people from Peru. The case study involved conducting participatory consultation workshops whereby the indigenous groups defined their development priorities and formed focus groups to create their own development plan. The key research question addressed the conditions required for improved access to information and knowledge. The case study sought to determine how information and knowledge could enhance the capabilities of the poor to achieve a lifestyle that they found valuable. Sen's capability approach was followed, as it was suitable for capturing a holistic evaluation of ICT4D given that ICTs are multisectoral. Gigler (2004: 8) argues that it is important to have information as an additional component of the sustainable livelihoods approach. This is taken from the view that the poor are entitled access to information.

The AEF aims to show the interrelationships between information capital and all the other capitals as displayed in Figure C2 and their importance for evaluating ICTs and the livelihoods of the poor. Inclusion of information as part of the livelihoods approach stems from the following four components as defined by the author (Gigler, 2004: 8):

- The level of access to information by the poor
- The poor's ability to evaluate and process information
- The extent the poor share and produce information, and
- The level at which indigenous knowledge plays a role.

These four components share some commonalities with Heeks value chain for ICT4D. Information capital further strengthens the other forms of capitals in the sustainable livelihoods approach. For example enhanced access to ICT skills can further enhance ones capability to make better life choices. With this in mind, information may lead to the empowerment of local people. However, the framework does highlight that there is no causal relationship between empowerment, and access to and use of information. It also highlights

the importance of assessing existing information systems within communities (Gigler, 2004: 9). It was often assumed that replacing existing community information systems resulted in the failure of new ICT4D projects.

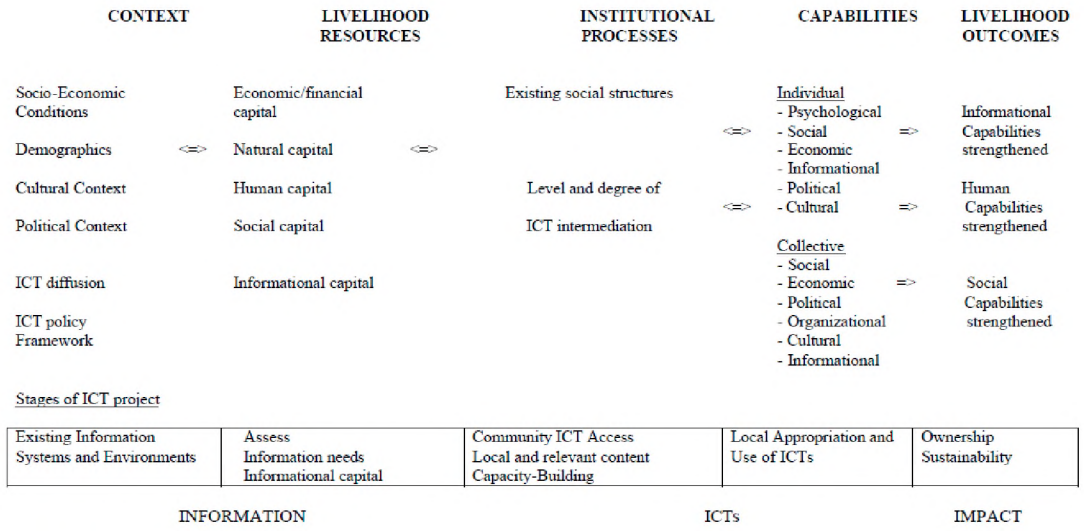


Figure C2: AEF (Gigler, 2004: 10)

The AEF identifies ICT training and capacity building as sub themes. The framework highlights five key dimensions for human development:

1. Social development
2. Economic development
3. Political participation
4. Cultural identity
5. Organisational development

Table C1 provides these key dimensions and their respective indicators. The framework makes use of qualitative indicators and it emphasises that empowerment is an on-going process that requires holistic and contextual analysis. The framework also suggests analysing individual and community empowerment separately. The impact indicators defined by the framework aim to bring about a practical application of the capability approach. The framework focuses on whether an ICT4D programme has enhanced people's informational, human and social capabilities. The framework also takes into account specific process indicators for analysing the role of intermediaries in the empowerment process. The reason for this is to draw attention to the idea that 'enabling factors' such as capacity building are vital for ICTs role in enhancing human and social capabilities. However, this discussion will focus on the impact indicators (Gigler, 2004: 12). As indicated in Table C1, individual empowerment can be analysed through six dimensions; i) informational; ii) psychological ii) social; iv) political; v) economic; and vi) cultural. These dimensions all contribute towards enhancing one's human capabilities.

Table C1: Individual empowerment dimensions (Gigler, 2004: 18)

Dimension	Objective	Outcome Indicator
Informational	*To improve access to information and informational capabilities*	✍ traditional information system strengthened ✍ information flows within community improve ✍ horizontal knowledge exchanges with other communities strengthened vertical knowledge exchanges with the state, donors, NGOs strengthened
Organizational	*To strengthen organizational capabilities*	✍ transparent selection of leaders ✍ increased efficiency ✍ improved information flows ✍ better coordination among different organizations ✍ networks with other indigenous organizations strengthened
Social Development	*To improve access to basic social services*	✍ improved access to formal and non-formal education (i.e. e-learning) ✍ improved access to health services (improved knowledge about health practices and traditional medicine) ✍ improved knowledge and access social programs of the government (e-government services)
Economic Development	*To promote economic opportunities*	✍ improved access to markets and commercialization of products ✍ improve productive activities through enhanced knowledge (i.e. better knowledge about agricultural practices) ✍ enhanced capacity mobilize resources from outside donors ✍ improved access to remittances through improved communication with migrant workers
Political Participation	*To improve participation in the political system* *To enhance transparency within community* *To improve participation in the political system* *To enhance transparency within community*	✍ improved 'voice' and participation in development process ✍ improved transparency of political institutions (e-government) ✍ enhance decision-making power in political process ✍ better coordination of political activities enhanced transparency of information flows within community ✍ direct participation in international policy dialogue (UN permanent forum
Cultural Identity	*To strengthen the communities cultural identity*	✍ indigenous languages strengthened ✍ indigenous knowledge strengthened ✍ improved dissemination of communities own culture

The framework relies on the capability approach to emphasise factors of well-being and as a result the psychological, social, and cultural dimensions are considered important for one's empowerment. Improved problem solving, self-esteem and sense of participation all form part of the psychological dimension and they strengthen one's ability to make life choices which forms a core part of empowerment. The positive impact of ICTs on psychological empowerment is also valuable in other aspects of one's life. For example, increased self-esteem may enhance one's ability to seek employment.

The second aspect for potential positive impact on empowerment is enhanced informational capabilities such as increased information literacy or increased ability to produce and disseminate information. In this case, information literacy is not only related to IT technology skills but it also includes the capacity to access, evaluate, process and share information in an effective and efficient manner. It also entails being able to distinguish between alternative information sources and to summarise information.

The third aspect for potential positive impact entails enhancing human capital, which focuses on improving people's ICT management and leadership skills (Gigler, 2004: 13). The impact of ICTs on the economic, social and cultural aspects of one's life is dependent on the effective use of ICTs to successfully achieve one's personal or community goals (Gigler, 2004: 16).

The concept of effective use is closely related to how people integrate ICTs into their economic, cultural, productive and social lives. The analysis of potential impact of ICTs should be based on the actual and realised uses of ICTs. For example, to assess whether ICTs have improved someone's capability to improve their income then it is important to understand their drive in using those ICTs. Lastly the AEF suggests utilising qualitative methods such as focus groups and in-depth interviews as means of assessing whether particular use of ICTs have led to a significant economic, social, or political improvement within the lives of community members. The framework highlights the need to take into account the 'perceptions' of community members about the benefits and risks involved from ICTs (Gigler, 2004: 16).

C.4. Adam, L. and Wood, F. 1999. An investigation of the impact of information and communication technologies in sub-Saharan Africa.

Adam and Wood (1999: 307) investigate the impact of ICTs in sub-Saharan Africa. The authors consulted ICT users from Ethiopia and informants from other African countries for the impact assessment of ICT4D. They made use of the grounded theory method and focused on user perceptions to conduct the assessment (Adam and Wood, 1999: 308). Theoretical sampling was employed and the comparative analysis technique was used to transcribe and analyse the data. The procedure followed for comparative analyses entailed generating codes from the field notes and interviews. Thereafter conceptual categories were created by comparing occurrences of the codes. The final procedure for analyses involved interpreting, verifying and refining these interpretations. From their paper four aspects of impact where identified: actual impact, potential impact, user centred actions, and constraints (Adam and

Wood, 1999: 307). Based on the analysis from interviews responses and field notes the four categories of impact were created and are briefly discussed below (Adam and Wood, 1999: 309):

- *Actual impact*
  Actual impact represents the current value of ICTs, their benefits, and their transformation in a complex social and organisational context.
- *Potential impact*
  Potential impact represents the gains and both negative and positive outcomes that may result from ICT initiatives
- *Constraints*
  Constraints represent the barriers that exist between potential and actual impact. Due to constraints there remains a gap between potential and actual impact.
- *Action centred*
  This form of impact relies on the cycle of participation of stakeholders, the relationships between actors, and the manner in which stakeholders cope with the constraints they face.

The case study identified five levels of actual impact of ICT in sub-Saharan Africa. Figure C3 displays the five impact levels (Adam and Wood, 1999: 310). In summary, areas such as cost saving, improved community communication, greater ICT awareness, improved ICT literacy, increased employment opportunities, reduction in business transaction costs, improved ways of learning, and increased ICT access have all been identified as actual impact of ICTs in sub-Saharan Africa. A key finding from the study is the low use of ICTs, which highlights the need for indigenous capacity building. Human capacity and skills innovation are important areas for impact assessment analysis. Important factors considered necessary to bring about a change in the quality of life of individuals included governments emerging with flexible and innovative ICT policies, increased awareness, specific application to the local context, knowledge and learning, and the development of appropriate infrastructure (Adam and Wood, 1999: 316).

Government	Education	Business	Organisations	Individuals
• Demystification of ICT in public institutions. • Improved communication and delivery of services.	• Increasing use of computers in education. • Pressure for new ways of teaching and learning in higher education. • Improving communication among researchers and research institutions.	• Emergence of a new breed of information workers. • Spread of ICT knowledge through or by business institutions. • Opportunities for employment.	• Improved awareness of ICT. • Greater opportunities in cost savings and new areas of ICT application. • Changes in the roles of professionals in organisations. • Increased numbers of outlets for access to information.	• Cost saving. • Possibilities to participate in global lists. • Professional diversification and job satisfaction.

Figure C3: Actual impact of ICT in sub-Saharan Africa (Adam and Wood, 1999: 311)

2015

Outcome and Impact Assessment Report

SIYAKHULA LIVING LAB

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Chapter 1: Introduction

The outcome and impact assessment of rural Information and Communication Technologies for Development (ICT4D) programmes is necessary to determine the role that ICTs play in such programmes. An outcome and impact assessment aims to describe the ICT project effects-intended, untended, positive and negative. To ensure that a holistic outcome and impact assessment is conducted, the assessment process should take into account the different evaluation domains that make up an ICT4D evaluation lifecycle. Such a process forms part of a comprehensive approach to evaluation. The outcomes and impacts of any ICT4D initiative should be understood in terms of five interrelated themes, as part of a comprehensive approach to evaluation. These key themes include: Strategic Value, Most Significant Change, Empowerment, Livelihoods and Sustainability. These themes are assessed based on criteria from previous evaluation reports, observations, and outcome and impact theory.

The Siyakhula Living Lab (SLL) has been operating since 2006, giving the project sufficient time for some form of outcomes and impacts to manifest. Furthermore, prior evaluations have been conducted for SLL: that is, the Baseline Study, Needs Assessment, Programme Theory Assessment, and Process Assessment. These previous evaluations all inform the Outcome and Impact Assessment to be conducted, to capture the relevant outcomes and impacts of the SLL. The lessons learned from the assessment, will aid in improving the SLL, and guide possible expansion of the project.

The following report outlines the results of the *Outcome* and *Impact Assessment* of the Siyakhula Living Lab ICT4D case, in the rural Transkei of South Africa. The report is outlined as follows: a brief background of the needs of the target community in Dwesa is described. The methods used to assess the project are then discussed. Subsequently, the report discusses each outcome and impact theme, and presents the findings.

Chapter 2: Prior Evaluation Findings – Community Needs

The SLL has had prior evaluations conducted, particularly the Baseline Study and Needs Assessment. These evaluations provide valuable information on what the community goals and community needs are, and provide preliminary project outcome information. Such information provides context to an outcome and impact assessment and provides a benchmark on which an outcome and impact assessment can be conducted. The following chapter outlines the needs and goals of the Dwesa community based on prior evaluations of the SLL. It also outlines the communication patterns of the community upon initiation of the SLL, which aids in determining the extent to which the SLL influenced communication patterns within the community. The chapter concludes with a section on identified outcomes of the project prior to the current outcome and impact assessment being conducted.

2.1 The Needs of the Target Community

From the Baseline Study report and Needs Assessment report, which were conducted in April 2009 and September 2009 respectively, there were several needs that were identified in the community, many of which could be linked to access to information and knowledge. Below are the highlights of the needs identified (Pade-Khene, Palmer and Kavhai, 2010):

2.1.1 Engaging with the Social and Political Sector

Rural empowerment and participation in the economic, social and political sector is an important aspect in the Dwesa community. There is a need to strengthen the voice of the community, to keep government accountable, to air their challenges, and actively employ their democratic rights. There has also been a challenge of poor (or non-existent) service delivery, which the community raised. Issues of transport, poor infrastructure, and poor education were among some of these issues raised in the area.

2.1.2 Tourism

Dwesa is known for its nature reserve and "unspoilt" natural environment that draws tourists from various parts of the world. The area is also characterised by its rich Xhosa tradition, which opened opportunities for cultural tourism in the area. People value their cultural heritage and community members, especially the youth, who believed that local arts and crafts could be promoted in the area to enhance entrepreneurial activity. The community felt that they could showcase their indigenous dance and heritage to the world and attract tourism to the area. The community also felt that they could enhance the market for arts and crafts.

This could be achieved by improving: advertising and promotion of products, communicating with potential customers or visitors to the nature reserve, identifying market needs and trends in order to tailor products appropriately, and see what is in demand.

Another identified need was the need to develop business in the area. People wanted information on how to start and manage development projects. Therefore, improving communication infrastructure could assist with communicating with urban markets; improve knowledge and information on market trends, market movement, and pricing products; and providing local business with an opportunity to have direct interaction with the market, hence eliminating the intermediary.

2.1.3 Health

There is minimal awareness on general health in the area and access to medical attention is limited. Issues of high teenage pregnancy, HIV, TB and unhygienic behaviour were common in the area, hence the need for the effective dissemination of information on general health. For example, how to manage hygiene and cope with disease is useful information needed. There was a need to be able to consult and communicate with professional practitioners and other clinics in other villages and specifically the nearby town, Willowvale. There was also a need to effectively communicate with health workers and keep up to date with health information. The clinic nurse displayed a need to keep in touch with chronic patients. For example, TB patients needed to be informed on how to manage TB, and reminded to take medication. Information on new treatment methodologies was another area in need identified for effective health care in the area.

2.1.4 Communication

Establishing networks and communicating with family is another important community need, identified during the baseline study. People needed to be aware of what is happening in nearby areas, how people manage crime in their areas and various activities, such as weddings, funerals and sporting activities. People needed exposure to entertainment, especially the youth. The youth are bored and wanted to keep abreast of the latest entertainment news, music, fashion, and so forth. Moreover, the youth showed an interest in making use of social media to meet new people and keep in touch with existing friends.

2.1.5 Education

Teachers and school learners identified a need to have access to materials to augment their teaching and learning. Through the use of the Internet, teachers could access material to

enhance their teaching, while learners could access information for their research assignments. Teachers could also access information and knowledge to improve their school administration and keep up to date with the Department of Education (DoE) curriculum. This ties in with what has been observed, at the time of the current outcome and impact report, whereby schools are now interacting and communicating with the DoE on a small scale.

Schools had the desire to interact with other schools, and collaborate and share ideas and knowledge. It was also noted that teachers wanted to be able to communicate with other schools and identify ways to manage crime in their areas and keep in touch. From the outcome and impact assessment data collected, teachers do make use of ICTs, especially the use of IP phones to interact and collaborate with different schools that form part of the SLL network.

2.2 Communication Patterns among the Target Community

According to the Baseline Study, communication patterns within the area were dominated by word of mouth and community meeting centres. It was noted that communication varied depending on the distance involved between the parties communicating. Within the community, it is considered natural to communicate via word of mouth, as residences are close by and people frequently walk around. Moreover, using a phone would cost airtime and not everyone has a phone. The preferred communication methods, in areas such as Ngwane, were mobile phones (45%), word of mouth (30%) and community meeting places (19%). Mobile phones were considered most useful between villages, as the distance between villages can be large. In terms of communication with people around South Africa, the most used were mobile phones (58%) and public phones (33%). Travelling to see people, via public transport was also an alternative option available.

Having central locations like clinics, and schools to hold community meetings was the second used method, which offered an opportunity for everyone to come together, air their views and share community information. Access to new ICTs, such as computer technology and smart phones was limited in the area. The use of mobile phones was mainly for social interaction and emergencies. At the time of the baseline study community members were not aware of how to fully utilise the use of a mobile phone. Community members depended mainly on traditional ICTs. The traditional ICTs used comprised of radio, television and newspapers, with radio being most frequently used, as radios are inexpensive and cheap to maintain.

2.3 Summary of Prior Key Outcomes of the SLL

In the early stages of the project, it was seen that for development purposes, improving the quality of education was the main focus. Learners should be equipped for the local market or employment in nearby towns, and to utilise the natural beauty and eco-tourism in the area. Furthermore, learners should be equipped to make room for increasing income opportunities for the dominantly female headed households. Some (highlights) outcomes of the SLL over the past 5 years have been documented (LEDSa, 2011; Pade-Khene et al., 2010):

- During the outbreak of the 2009 swine flu, there was a case of the culling of pigs in the area to control the disease. Community members were not compensated for the work done. Through access to the Internet, community members were able to file complaints by downloading relevant applications for compensation. Till today, this particular example echoes through the community, where it is observed that community members access the Internet to interact with government officials.
- Community members, teachers and learners have been trained on basic e-skills. This has heightened the image of the schools that are part of the living lab, as they appear more attractive. Learners then do not have to travel into neighbouring towns or cities, in the hope that with computers at the school, the level of education would improve. More importantly, people have used their ICT skills to teach others, and find employment in community projects in the area.
- Teachers in the area also had an opportunity of obtaining in-service teacher training qualifications, specialising in ICT, through Rhodes University. During the baseline study, teachers were keen to learn how to improve their teaching strategies. Teachers took part in the Advanced Certificate of Education (ACE) programme, through Rhodes University, to improve their ICT skills and teaching strategies. This has given this marginalised community the opportunity to address the lack of education centres in the area, to obtain such qualifications.
- There was an incident where a machine was stolen after the first lab was opened. After a joint collaboration of community members, the machine was recovered. This demonstrates the ownership of the project and pride in the project that the community has taken on.
- Community members, mainly the middle aged population, had the perception that the computers were only for students or the youth. This perception still continues to filter

through the community. There is still a need to create greater awareness in the area about the services offered by the SLL, and the potential of ICTs to access information.

The baseline study also indicated some recommendations to support the development and integration of the project in the community:

- More structured training should be offered in isiXhosa. Training should also provide certificates as proof to motivate people to attend.
- Local capacity should be strengthened by, training influential people to train and encourage others in the area.
- Residents should be informed on the potential of accessing services on mobile phones, such as mobile banking, which saves on transport costs to town.
- Lastly, it was recommended that awareness should be raised on how phones and the Internet can complement existing communication patterns (Pade-Khene et al., 2010).

Chapter 3: The Outcome and Impact Assessment Methodology

The assessment of the outcomes and impacts of the SLL took place mainly in two villages in Dwesa. The selected villages are Ngwane and Nqabara, as these two areas had the longest exposure to the SLL services, and are suitable candidates for assessing for outcome and impacts. Furthermore, Ngwane and Nqabara were the two central locations chosen for training at the time of the Outcome and Impact Assessment. For purposes of the survey conducted a total of 160 questionnaires were distributed between Nqabara and Ngwane, 80 questionnaires for each village.

The following chapter outlines the methods and procedures followed to conduct the Outcome and Impact Assessment. A summary of the evaluation questions used to guide the assessment of each outcome and impact theme is discussed. . Subsequently, the process followed for collecting data and how it was analysed is then outlined. A discussion on the relationship between project stakeholders and the researcher concludes the chapter.

3.1 The Evaluation Questions

Five assessment themes have been identified as key to evaluating the outcomes and the impacts of the SLL. These themes include Strategic Value, Most Significant Change, Empowerment, Livelihoods and Sustainability. The research questions that guide the Outcome and Impact Assessment were as follows:

1. Strategic Value
   - 1.1 What strategic value is the project adding within the community?
   - 1.2 Are project outputs equipping project recipients to achieve community goals?
2. Most Significant Change
   - 2.1 What has been the most significant change that has occurred in the community
   - 2.2 What would project recipients like to see differently as a result of the project?
3. Empowerment
   - 3.1 Have the project recipients' informational, human, and social capabilities been expanded?
   - 3.2 Have the project recipients' assets (psychological, informational, organisational, material, financial) been enhanced as a result of the project?
   - 3.3 Has the project recipients' pool of choices been expanded as a result of the project?

3.4 Have the project recipients utilised the choices available as a result of the project and have desired results been achieved?

4. Livelihoods
   4.1 What livelihood objectives were anticipated to be met as a result of the project? And have they been met and how?
   4.2 Has the project aided in enhancing the project recipients' capitals?
   4.3 Has the project affected the project recipients' livelihood strategies (ways of making a living)?
5. Sustainability
   5.1 What measures have been put in place to ensure the positive outcomes and impacts are sustainable?
   5.2 What measures have been put in place to mitigate the negative outcomes and impacts that have been observed?

3.2 The Methods and Procedures

Four assistants were employed to distribute questionnaires, each with 40 questionnaires to distribute. Due to unforeseen events, only one assistant was able to complete the distribution for Nqabara. As a result, only 40 questionnaires were distributed in the Nqabara village, with 20 responses being returned, which makes up 50% of the valid responses. In total 87 responses were obtained from a sample of 160 questionnaires from which only 120 were successfully distributed. For purposes of the assessment, five main methods were used to elicit data:

- **Interviews**
  - Interviews were held with teachers and community members, where participants could detail the significant changes they have observed since the SLL began. Interviews also aided in eliciting information on whether people's capabilities were enhanced, and how ICTs affected their way of living.
  - Interviews with the project team and active project participants provided in-depth detail as to how the project is equipping the community to achieve its goals.
  - Lastly, interviews with the project team and management aided with identifying the measures put in place to ensure sustainability of project outcomes and impacts.
- **Narratives**
  - Storytelling narratives from the high school children who have been participating in the SLL provided rich detail on the changes brought about by the SLL.

- The learners were requested to provide their views on the most significant change that they have observed in the community. They also provided recommendations on the changes they would like to see in the SLL.

- **Survey**
  - Survey questions were distributed to community members to elicit a general view on how ICTs affected their way of living.
  - Survey questions were used to determine whether community members are aware of the role the project plays in facilitating the attainment of community goals. Survey questions aided in gathering information from a wider group of community members, who have been affected by the project. It gave an overall idea on key empowerment areas that the project has brought about or undermined. Such information was then investigated further during the interviews.
  - Survey questions with active project participants, aided with eliciting further information on the sustainability of outcomes and impacts observed within the project.
- **Participant Observations**
  - The researcher spent time taking part in the literacy training at Ngwane, Nqabara and Badi schools. The basic computer literacy training was conducted at these three schools (first at Ngwane and Nqabara, which then changed to Ngwane and Badi), which offered an opportunity for the researcher to engage with the project.
  - The researcher took field notes on how the project operated on the ground and the views and opinions of community members as they took part in the training.
- **Documentation**
  - Documentation of previous evaluations aided in providing background details of the various outputs the project produces to best position a community to achieve community goals.
  - Documentation of previous evaluations, namely the Process Assessment, provided useful data on ICT usage and whether meaningful use has taken place which may lead to outcomes and impact.

3.3 Analysis of Data

The data collected was analysed through quantitative and qualitative means. The survey data was analysed through descriptive analysis techniques with the use of the SPSS software. The data was grouped for each question to determine the frequencies for different aspects that

relate to each of the five themes. The aim was to gain a general view on what effect the project had.

The data from the interviews, previous records, participant observations and narratives were analysed through a process of thematic analysis using the Atlas.Ti tool. The data was, subsequently categorised according to the outcome and impact themes identified.

3.4 The Evaluation Participants and Stakeholder Relationship

The evaluation follows a collaborative evaluation, which includes various project stakeholders. Involving stakeholders continuously and actively, aids with drafting evaluation questions, while sharing their concerns and ideas they may have. Furthermore, the evaluation elicits the assistance of three local evaluators. The local evaluators assist with the distribution of questionnaires to various households in the community.

Community members and teachers, who receive the services being offered by the SLL, form part of the key participants in the evaluation, as they provide information on the outcomes and impacts the project has had within their community. Target participants aid in providing feedback on how the project is functioning and the long term effects on the community to date. Although all groups may provide details for each theme, the evaluator should be aware that certain groups can provide more details for particular themes. The following should be noted:

- The project champions, who are closely associated with the day to day operations of the project, play a key role in the evaluation planning process. They have access to the relevant project participants who would provide meaningful data for the evaluation. Furthermore, they are more familiar with the project context and the environment in which the project operates, and would have insight into who to approach, how to structure questions and arrange contacts within the community. Furthermore, project champions would be able to identify local representatives who will be capable of assisting as local evaluators.
- Program managers would provide access to previous evaluation records and previous research done on the project. Program staff and managers will be most beneficial for the *Strategic Value* and *Sustainability themes*. *Strategic Value* and *Sustainability* involve data related to the management and leadership of the project and requires strong input from these groups as they direct the project.

- For most *Significant Change, Empowerment* and *Livelihoods*, these themes target end users and the wider community as these themes have a primary focus on the more long term effects (impacts) the project has had on the community.

Chapter 4: Outcome and Impact Assessment Findings

4.1 Overall Descriptive Statistical Findings

The aim of the survey was to gain access to people who have made use of the services offered by the SLL to elicit their views on outcomes and impact. However, there were respondents who did not make use of the SLL services. They provided some useful background information based on the observations they made in the community since the inception of the programme. The initial view, for having a bias towards people who have made use of the services offered by the project, was that a greater part of outcomes and impacts result from having made use of the services offered (Rossi, Lipsey and Freeman, 2004). Therefore, there is a higher likelihood that some form of outcome and long term impact will result from that use or engagement within the project. Of the 80 questionnaires distributed in Ngwane, 67 were returned which makes up 83.7% of the Ngwane sample. From Nqabara village the response rate was much lower with 23% responses (20 from 80), see Figure 1.

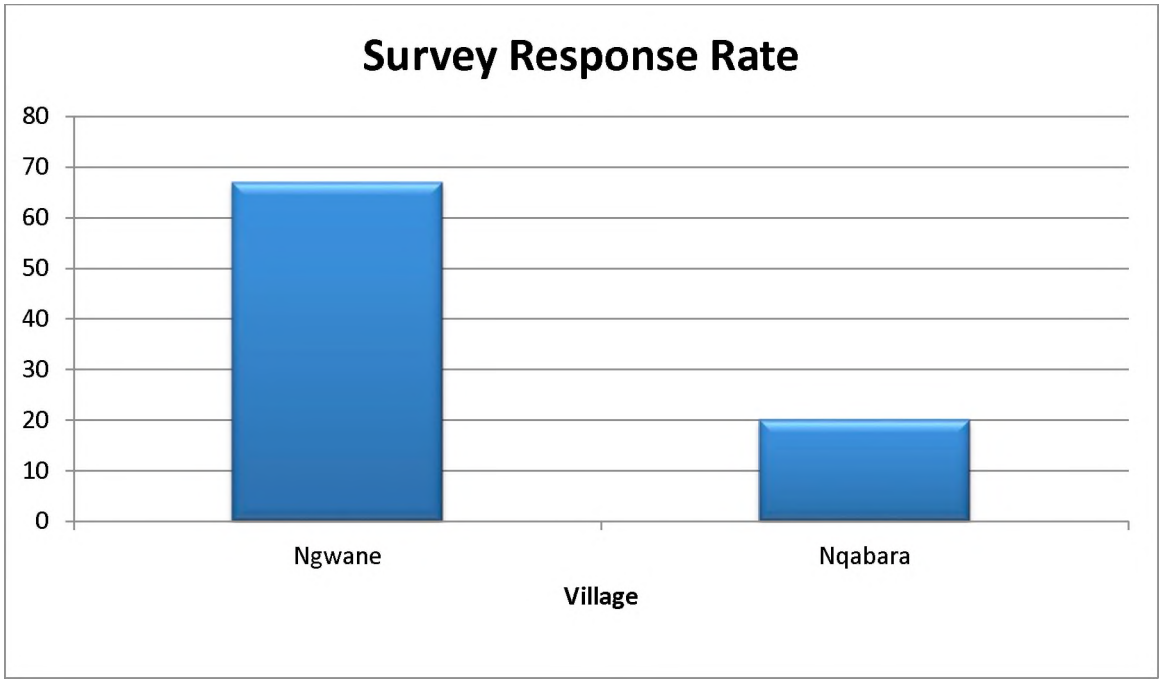


Figure 1: Survey Response Rate

4.1.1 Respondent Demographics

The majority of the people who took part in the survey are females, making up 62.1% of the respondents. From the Process Assessment, females dominated the training sessions offered by the project (Process Assessment Report, 2012). From the surveyed population, 45 (51.7%)

respondents lie between the ages of 18-30 years, while only 4 respondents (4.6%) are above 50 years of age. The above results mirror the Process Assessment results, where the majority of users comprised of the youth and middle aged. See Figure 2, for the age distribution of respondents.

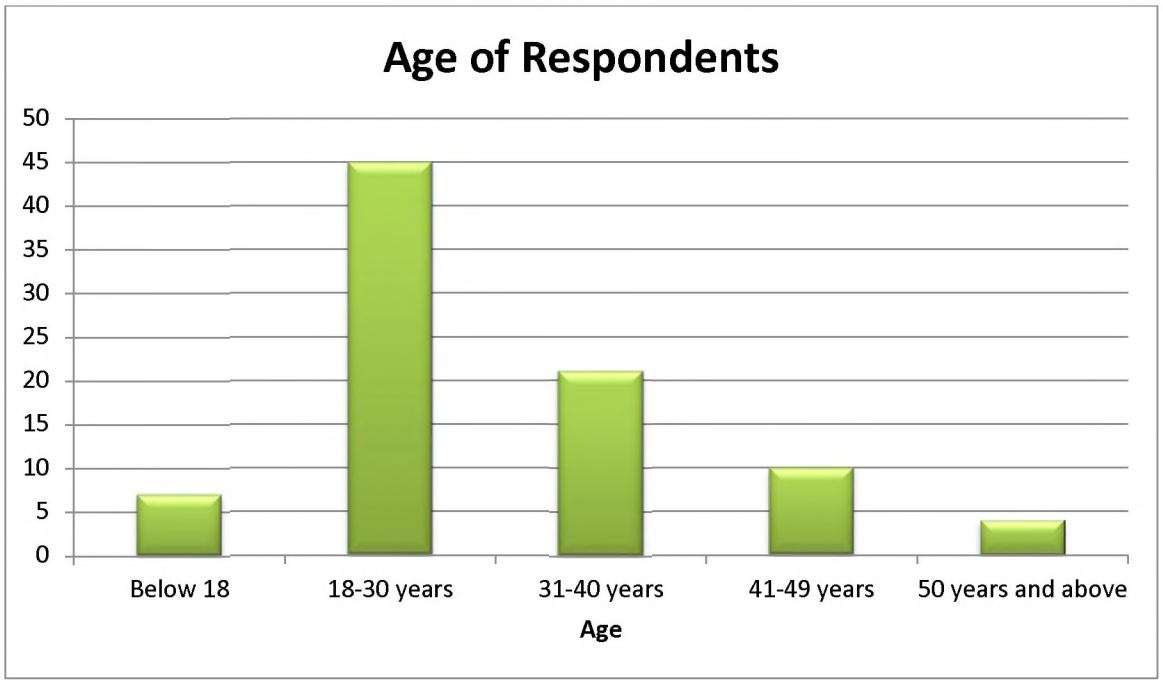


Figure 2: Age Range of Respondents

The unemployment rate in the area is still rather high, as indicated from the Baseline Study. From the survey respondents, 87.4% were unemployed, while 5.7% were self-employed. This again reiterates the deep rooted problem of poverty and unemployment in the area.

4.1.2 Training and Community ICT Usage Patterns

77% of respondents have been trained to use computers at the schools, see Figure 3. The majority (74.7%) of the respondents appreciated the training offered and enjoyed making use of the facilities (Internet, and printing facilities), see Figure 4. The majority of users come in at least once a week to make use of the services offered, see Figure 5. 31% of total respondents make use of the computer services on a daily basis, while 36.8% make use of the services on a weekly basis.

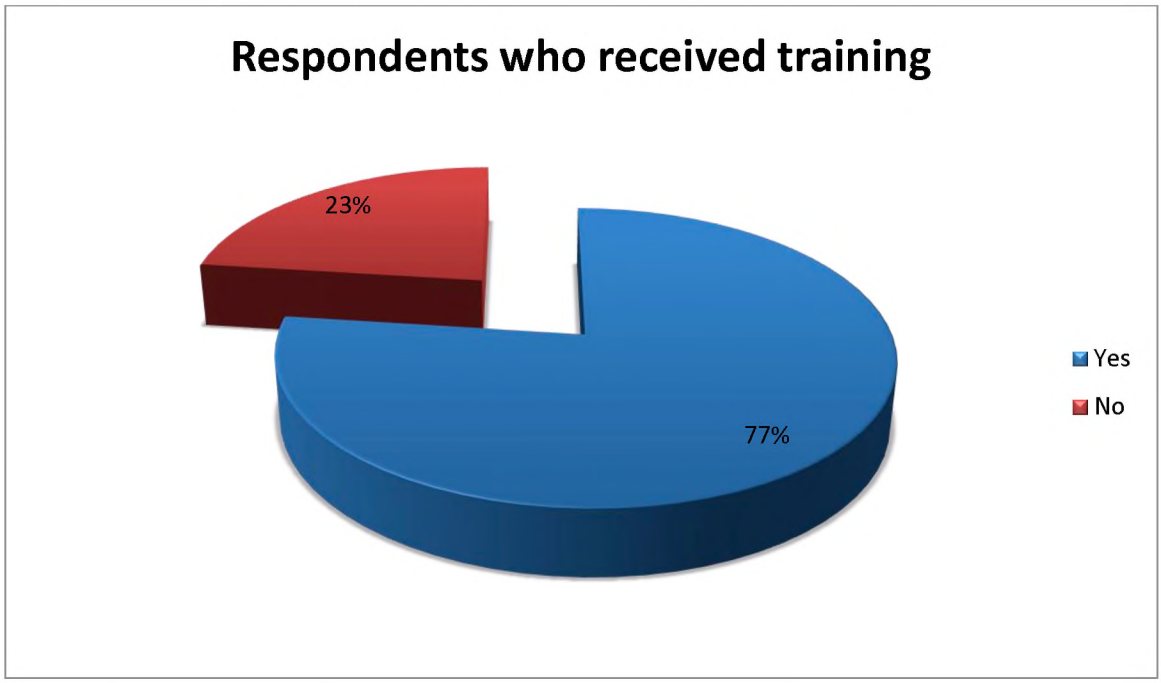


Figure 3: The percentage of respondents who have received training

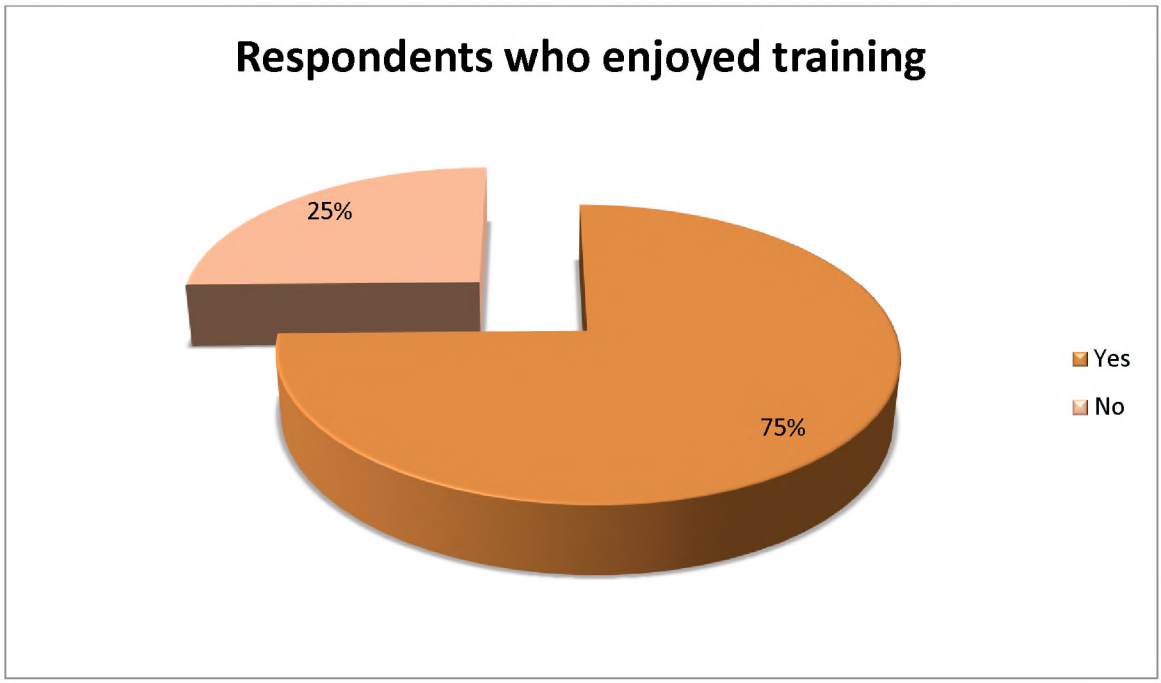


Figure 4: The percentage of respondents who enjoyed the training

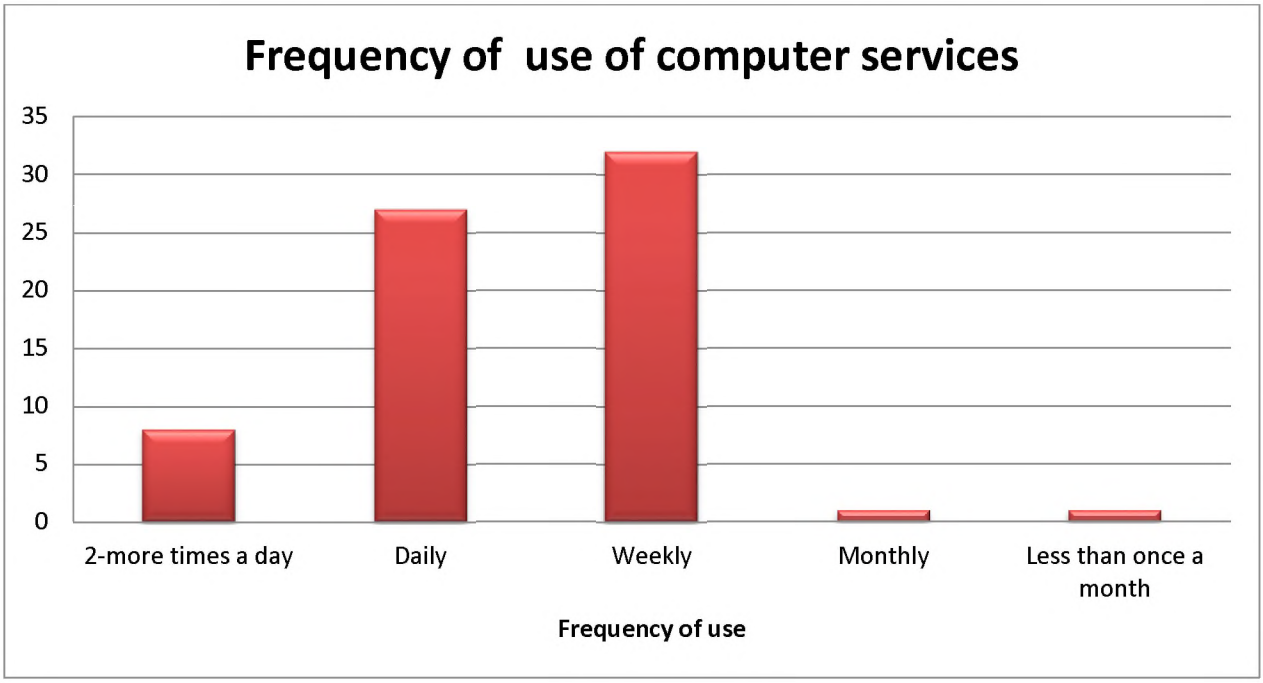


Figure 5: Respondents' computer usage patterns

4.1.3 Respondents' knowledge of the SLL services

Of the respondents surveyed, 77% indicated that they knew what the SLL wanted to achieve, while 22.9% of respondents were not aware of what the project aimed to do. This is not surprising given that these 22.9% of respondents do not make use of the services offered by the project, nor have they attended the computer literacy services offered. The majority of respondents could indicate specific aims the project wanted to achieve. The importance of knowing this information is that once people are aware (including understanding its significance) of a project's contribution and what it aims to do, will they start making use of these services (Process Assessment Report, 2012). As long as there is minimal awareness, then usage will also be affected (Process Assessment Report, 2012). From people's understanding, the SLL project aims to:

Table 1: Community view on the services provided by the SLL

Aims	Percentage of respondents
Provide access to education	87.2%
Provide access to knowledge	73.1%
To help different communities to collaborate and communicate	46.2%
Provide information on how to start development projects	42.3%
To help communication with family	41.0%

Aims	Percentage of respondents
To provide entertainment (games, music, fashion, social media)	41.0%
Support people to share their views and opinions	39.7%
Support local arts and crafts	33.3%
Provide health information	29.5%
Assist tourism in the community	16.7%

From Table 1, "providing access to education" and "providing access to knowledge" are the dominant views, by the respondents, of the services offered by the SLL. The SLL has mainly been associated with the schools in the area, given that the points of presence are all located in the schools. Therefore, the majority of outcomes and impacts identified focus on education and the schools, more than the community at large. Moreover, schools learners and teachers have more contact time with the computer facilities, as the project location (the school labs) is convenient for them to access the facilities. Therefore, they have more opportunity to apply what they have been learning. Community members also appear to be in the early stage of using computer facilities. They have not become active participants in the process. As from the Process Assessment, the levels of usage were quite low in the area for both Nqabara and Ngwane villages (the two active points of presence at the time of the Process Assessment). As a result, it appears that community members only access facilities to read news articles or access information on a very basic level. Even from the time of the baseline study the few community members, who had Internet access (for example, from their smartphones), read online newspapers. Furthermore, during training sessions people are informed that they can access various information and knowledge through the project. However, through observations, there is some indication that community members are not active in this process. They are not active in the process of shifting from 'access to information' to 'translating information into knowledge', to 'understanding information', and lastly actively 'applying information' to one's livelihood.

4.2 Strategic Value

4.2.1 Purpose

Strategic value aims to assess a project from a forward looking perspective. It determines the value that is being added in order to achieve community objectives and facilitate further development agendas. It has often been a case that ICTs are viewed as drawing development

resources and funds away from more pressing concerns, such as, health and education; therefore, it is important to justify the role that ICTs play and how a project aligns itself within the broader goals of the community and human development (Hamel, 2010).

The assessment of Strategic Value requires the assessment of the *positioning* of a community in favour of achieving desirable outcomes and impacts. For such an assessment, it is important to ask how the project has equipped the community to achieve community goals. This can be achieved through identifying the different project activities that take place to assist the community. Strategic value also entails expanding a supported development programme into new avenues and assessing its future prospects.

4.2.2 Strategic Value Outcomes

The assessment of Strategic Value identified immediate outcomes that could be categorised under the following psychological factors: attitude, knowledge, awareness, skills, motivation, and behaviour intentions. Considering that the assessment of Strategic Value focuses on how community members are being equipped to achieve the goals they desire, the assessment results comprise of outcomes and not impacts. In the long term, impacts will then result, based on the type of outcomes identified from the assessment of Strategic Value. The resultant impacts are then categorised as part of the Empowerment or Livelihood themes. The following outcomes were identified from the assessment of Strategic Value: ICT literacy skills development, awareness of SLL services, awareness of the different possibilities that technology can offer, motivation to adopt ICTs, and change in attitude and behaviour as a result of gaining computer literacy skills.

4.2.2.1 Skills Development

A) Opportunities

ICT literacy

From the interviews conducted with teachers and project champions, and the story narratives from learners, a noticeable feature of the SLL has been the basic computer literacy training. Giving community members and learners an opportunity to learn about something they are foreign to and only hear about, has been a significant change the community has taken note of. One teacher mentioned that learners are being exposed to technology that they knew nothing about. They now know the basics of the Internet and even want smart phones to continue exploring the Internet beyond lab hours. As one project champion noted:

"It has brought us knowledge about the computer because as village people we are living in the dark and don't know a lot of things, but because we now have computers we can come learn, whatever you want to learn. You can come here to the computers and come print in order to broaden your knowledge".

Seeing and using computers is a foreign concept to many community members and learners in the Dwesa area. The basic computer literacy training includes introduction to Writer and Calc, which form part of the Edubuntu open source operating system. These skills aim to prepare community members, teachers and learners to utilise ICTs in support of achieving: improved education in the area; better health awareness in the area; boost tourism in the area; and engage with government services. These basic skills are also aimed at making the various aspects of their lives more manageable, such as: typing out documents, and making use of emails to communicate with those who are not in close proximity. The SLL also acts as a support structure for the community and acts as a link to different government services to support community needs.

Community members and school learners learn how to type, how to navigate a computer, and use the Edubuntu software. Community members are also taught how to use the Internet and the varied possibilities that are offered by the Internet, such as setting up email accounts. They have an opportunity to search for various information regarding different topics. Community members, especially teachers feel that they are now a part of modern society as one mentioned: "*we are exposed to the modern world*". They gain an indication of what is happening beyond the boundaries of Dwesa and even in other provinces in the country. For a few community members, the basic skills acquired assisted them in finding employment and earning some income. This has been observed in community members who went for training, engaged with the project, and also assisted with helping training other community members. They showed eagerness to learn, showed initiative, and wanted more out of life. These were the individuals that were willing to put in the hard work. Another group of project recipients that gained the most from the literacy training have been the school teachers. Teachers have more contact time with computers, as the labs are located at the schools. As a result, they gain more practice time, more interaction with the project team, and more personalised assistance when they feel the need.

From the interviews conducted, one remark that stood out amongst community members was the interaction of the project team with the community. Community members appreciated

project team members who treated people well and with respect. It appears that it is important for the community to be treated with respect, and for the project team to interact in a friendly manner, and not act like total outsiders. The students who work on the project are constantly changing as they complete their research and new students join the project. As a result, there are continuously 'new faces' training community members. Therefore, treating community members with respect renders them more welcoming, and community members then focus on the learning aspect.

ICT maintenance

The project assists with educating the project champions and teachers at the schools on the basics of troubleshooting and maintaining the lab equipment. These are the people who are directly involved in the project. Not only are they acquiring basic computer usage skills, but also skills on how to maintain and look after these facilities. Project champions are now able to conduct basic troubleshooting, and give more detailed feedback to the project team as to how the lab is functioning from a more technical perspective. As a result, when any repair work needs to be done, the project team has a better understanding of where the problem might lie. They can then send people with all the necessary resources to rectify the technical issue that had arisen.

A) Shortcomings

From a training perspective, the literacy training that takes place is rather limited for various reasons. Participants do not attend lessons regularly especially in cases where they may have issues with transport, bad weather causing roads to be flooded, or venues being too far. For many, the only exposure and time that they get to use computers are at the training hubs (the schools). Many community members do not own personal computers and therefore have minimal computer contact time. There have been several comments that community members have to travel some long distance to make use of the computer facilities at the schools. It shows that people are genuinely interested in learning, as they are curious what computers can do, and hence, the complaints about not owning personal computers and not enough time to practice. Minimal contact time does not provide community members with the opportunity to practically apply and reinforce the skills taught. Consequently, community members have concerns that it is easy to forget their skills if they do not practice often. Such limitations in the learning process hinder the process of integrating ICTs in one's life. ICTs will continue to be used in a representational manner, whereby one merely learns about computers and

acquiring the computer skills, rather than also using ICTs for generating knowledge (Hodgkinson-Williams, 2006)

4.2.2.2 Knowledge and awareness

A) Opportunities

ICTs and emerging possibilities

Through the SLL, different avenues of exploring technology beyond basic literacy skills are emerging. The potential of technology is becoming more evident to community members and the schoolteachers. They are developing an attitude of curiosity and exploring what technology has to offer. This has been observed mainly with the teachers who have been actively involved in the project, and demonstrated eagerness to do more with the skills they have learned. For example, at Ngwane before they acquired a projector, one of the teachers and project champions at the school identified a need to have class demonstrations projected for everyone to see at the same time, without having learners hurdle around the teacher's computer. As a result, this teacher's enquiry has led to the school acquiring a projector. As the needs of the school and community evolve, the SLL has made efforts to try and accommodate those needs according to the means and resources available. In another case, after having attended the training, one teacher wanted to be able to take images from the textbook he uses to teach and have multiple copies distributed to learners. This need arose as the learners did not all have access to that particular textbook he was using. As he was enthusiastic about the technology, he wanted to explore technology further, and went on to purchase an all-in-one printer for himself. He then started to scan images from the textbook for his subject and print copies for his learners. However, he was not aware of the legal implications of photocopying materials from textbooks.

Awareness of SLL services

For most community members, the first thing that comes to mind with regards to the Siyakhula living lab is learning how to use computers. Teachers and parents feel that they are becoming more informed about the computer literacy skills offered. The schools, in particular Ngwane often hold meetings with parents at the schools encouraging them to attend training and reminding them that it is free and open to everyone to come attend and search for information. The community is aware that there is no age limit for attending training and that everyone is welcome. Even old people and those that already have knowledge of computers can still attend if they would like to refresh their skills. However, it appears that some

members still fear attending training. They also become discouraged when they observe other community members who have no change in their lives despite having attended training.

There is still a view that more public awareness needs to be raised about the project. A recurring suggestion has been that the SLL should be promoted more, so that more people are aware of the project and aware of what the project does. As one community member mentioned: "*the project needs to be promoted more to attract more people*". It appears that there are still people who do not know about the project itself, who do not use the project facilities or who are just not aware of how the project facilities can assist them. Despite the parent teacher meetings at the school informing them about the SLL, it appears that community members would appreciate increased awareness of the project and its services. There is still a keen interest in increasing awareness of the project. This suggestion from the community aligns with the SLL goal to further market the project, promoting it as a "place for process and product innovation" (Siyakhula Living Lab, 2012).

The project champions and teachers have confidence that the SLL team is responsible and has knowledge and understanding of how to manage the project. There is a level of awareness that the SLL maintains the machines and all equipment on their own. As a result, there is a level of expectation amongst the schools that the project team knows what they are doing, therefore the project will yield good results.

Advisory role of the SLL

The SLL, further, assists the schools in other spheres, beyond basic computer literacy, acting in a more advisory capacity. It has built a relationship with the schools, which act as the centres for the computer labs. It is also seen by the community as the link to improving the socio-economic state of the area beyond merely offering ICT skills. For example, at Ngwane the SLL assisted in the purchase of a whiteboard and projector for the school which was needed during class presentations. The project also assisted with the installation of an alarm system for the lab and training teachers and the school caretaker how to operate the alarm. A key stakeholder – the project manager – is seen by the community as someone who, further offers advice on utilising ICTs on a personal capacity. The project manager continues to offer advice on ways to interact with different government departments and offer advice for those who may have personal concerns.

B) Shortcomings

Language Barriers to effective ICT skills development

Some community members have a lack of understanding of the computer basics taught, due to language barriers. Community members prefer to communicate in their home language, which is isiXhosa. However, some computer aspects are not easy to teach using isiXhosa, as some concepts are foreign in the home language. Furthermore, not all trainers can converse in isiXhosa. These barriers in communication hinder community members from adjusting quickly and effectively acquiring the basic computer literacy skills. Hence, the project attempts to have a combination of trainers who speak English and isiXhosa, as was outlined in the Baseline Study and Process Assessment reports. This seems to work well as community members who do not understand a particular concept in English can have it explained in isiXhosa as well. However, there are some community members that have shown fear of speaking up or seeking for help during the training. They are often reluctant to indicate that they do not understand some concepts being taught. Some go as far as pretending to understand, and only once they are given an exercise or test does one actually see that they are struggling. This has been observed to be the case in instances when trainers appear to be intimidating or unfriendly. It has also been observed in cases where the class is moving at a fast pace and one or two trainees are lagging behind. It was noted that it is useful to have constant feedback and communication with community members. Close contact with community members helps to find out their progress on a more personal level. Such information then gets filtered to the trainers, in the form of feedback to try and ensure that everyone gets assistance, which has been observed in the SLL since 2014.

Limited Contextualised ICT literacy

It has been observed that the training offered appears to be a mere transfer of computer literacy skills and, as a result, minimal application of skills taught actually takes place. There is minimal generation of own knowledge as majority of people just attend computer literacy training to gain the literacy skills and a certificate. As a result, there is a lack of depth in the learning process. Often you will find that community members come for training and acquire the basic skills, yet they have minimal awareness of how to apply these skills and incorporate them in their daily lives. People are often not sure what to do with the literacy skills they have acquired.

A key output the project recipients' gain is a certificate of having attended basic computer literacy training. Yet, that certificate does not always translate into the goals they would like to achieve. As a result, it is found that it is the younger individuals who are self-driven and self-motivated, that apply the ICT literacy skills to their own context. It has been noted that they make the effort to further enquire and equip themselves with more ICT skills to support their daily activities. Similarly, the teachers who are self-driven, and who already have some form of formal education, tend to be the ones who put in the extra effort to go beyond what is taught during the training.

As much as people have been empowered to have a choice to attend training, and utilise their computer skills, they are still limited in terms of the application of the skills acquired. Community members are not exercising their full bargaining power given the socio-economic context in which they live. For example, those community members who have no formal education find it difficult to apply the computer skills taught to their way of living. Most community members do not see how learning the basics of operating a computer can assist one in their daily lives. Moreover, the training offered is not contextualised to the needs of the community. It is kept rather broad, and community members, themselves, have to then take initiative to make the most of those skills taught. In light of this accessing information does not immediately translate into meaningful use of that information (Gomez and Pather, 2012). Therefore, despite the plans for the SLL to upgrade the Internet connectivity at the 17 schools, there still needs to be strong alignment between access to information and the development goals the community wishes to achieve.

Limited knowledge of the SLL

Two students at Badi Senior Secondary School (SSS) spoke about nepotism at the labs indicating that people employ their relatives to work in the labs. It appears that some people are under the impression that people who conduct the training get paid or are employed by the project. However, that is not the case. Most of the trainers are Masters, Honours and Phd students from Rhodes University and the University of Fort Hare, who assist with the training as part of their research work. For some of these students their research theses are based on the SLL. Engaging in the training gives them an opportunity to have first-hand experience on how the project is operating, and moreover, conduct their data collection. Wrong impressions of the SLL tend to create a negative image of the project in the eyes of project recipients, such as the case of the two Badi SSS students. As a result, it has been observed that they do not become actively involved in the project and "own" the project.

Copyright infringement

Community members are not fully aware of copyright laws and the implications of distributing multiple copies of various online or textbook materials. For example, the school teacher who made multiple copies of an image from a biology textbook for his students was not aware that in some instances that could be illegal. As teachers become more proactive in their use of ICTs, they are not aware of the boundaries associated with the use of ICTs, such as copyright laws. Now that they have access to information or different ways of distributing information they risk crossing boundaries they were not aware of. The teacher who made multiple copies for his students was fulfilling a need for more class materials due to a lack of textbooks at the school. However, the processes of fulfilling that need, with his newly acquired ICT skills, may put him and the school at risk. There is a need to also equip the teachers at the schools with the necessary regulations associated with accessing information and using ICTs.

4.2.2.3 Motivation

A) Opportunities

There is a strong (41.4% strongly agree and 34.5% agree) view that the SLL has had a positive influence on the community. People feel motivated to take a stand to do something about their current socio-economic situation. They become interested in exploring new avenues with technology. People also feel that they are given new ideas, broadening what is known to bring about change in their lives. It has been observed that there is increased hope in the community that change is coming. There is hope that community needs are being attended to. Moreover, people are motivated to see how others have utilised ICTs to make a difference in their lives.

People further demonstrated their interest through suggesting that an Internet cafe be set up in the community. It is quite a distance to travel to the nearest town, Willowvale, to access the Internet or make use of photocopying and printing facilities. This interest has been shown especially by those people who study or work in urban areas. Therefore, when they come home for holiday it is rather difficult to travel into town to carry out tasks requiring technology. The project champion at Ngwane mentioned that with access to computer facilities it gives people something to do and keep them busy rather than just sitting at home doing nothing. It appears that some community members feel the need to be productive

rather than being idle. Being idle is seen at times to lead to social ills in the community, such as, crime and alcohol abuse, as stated in the baseline study.

People travel long distance to attend training and there have been suggestions to have more training centres opened so that more people can attend. This demonstrates that there is an interest from the community side. Community members also feel that with more training centres there will be more contact time with the technology to practice. The new Mpume lab that was set up in July 2014 has been "long overdue", as one of the teachers at Mpume mentioned, again demonstrating the community's interest in the computer project. More so, they are interested in not being "left behind" and instead, being a part of the SLL trend. It appears that having a new lab creates an image of importance.

The learners at the school appear to be more interested in the more practical subjects, such as, learning how to use computers. They prefer the application aspects as compared to the theory. For example, they prefer application of theory taught beyond merely hearing about what one can do with computers. This is the main reason, as indicated by one teacher, which draws the learners towards the computer literacy session. High school learners adapt more quickly and learn faster, mainly because they learn at a much earlier stage and adapt more easily to the technology. Having been exposed to the Internet at the schools, the learners from the schools are now getting smart phones or want smart phones so that they can make use of the Internet on their phones as well. This has opened up new avenues to becoming exposed to other types of technologies that do the same thing. Exposure to the Internet has opened up a desire to interact on social media beyond the school lab. Although, some learners have already been exposed to some social media such as Mxit, they are now being exposed to even more avenues, hence the desire to own smart phones as well.

4.2.2.4 Attitude and Behaviour

A) Opportunities

Keen interest to learn

Prior to the SLL inception, in 2006, Ngwane JSS had purchased its own computers. However, there was no one to teach computers at the time. The introduction of the SLL created excitement at the school and the teachers have continued to show eagerness to have computer facilities at their school and acquire basic ICT literacy.

Initially people knew nothing about computers and found it rather difficult and feared these "machines", as some people would call them. However, with the opportunity to learn and encouragement from the project team and teachers, especially those directly involved in the project, community members then showed some interest and tried to learn. It has been noted that it is often female community members who are eager to learn and who make regular use of the facilities. People go to the labs either to learn how to use computers with few returning to recap the skills they have learned in previous training sessions. For example, one of the younger community ladies who attended training acquired a job as a cashier at one of the clothing stores in the nearby town. She showed great interest in learning more about computers, as she used to assist fellow employees in the store with handling computerised work. She then returned to Dwesa and attended another training session to improve her skills. In her interview she mentioned:

> "*… when I first came here I knew nothing about computers I didn't know how to type, how to print and all of that stuff but I learned everything here with the help from you guys. I tried to share as much information with others and that is how I got to be good. It has helped me a lot because I firstly started in 2009, then I went to look for job and I submitted my CV with that certificate then I got a job at Jet Stores as a cashier. Sometimes they will ask me to help with paper work at the office, I would occasionally help. Then again in 2012 I attended the classes and learned a lot.*"

It has been observed that people who show a genuine interest in learning, or have a drive to equip themselves with skills, tend to go back to improve their computer literacy skills. As the training is for free, some community members feel fortunate that they can now also engage with technology much like people in more urban areas. They also feel blessed that they are not being charged for these services and do not have to travel into town to acquire these basic skills. It gives them a sense of pride knowing that they are not being left behind and things are not as foreign to them as it were in the past. Moreover, having free training gives learners at government schools an opportunity to also learn computer skills, much like those learners at private schools.

Often people want to see tangible or more practical evidence of how technology can assist them. It is such cases where people see others utilising technology in different ways and applying the skills taught that they also become inspired and show interest in learning as well. For example, a teacher at Nqabara often had other teachers coming to her to assist with scanning documents, how to print, or create typed rosters rather than handwritten one. This

became evident after some time when they noticed that the teacher who made use of the technology at the school was more efficient at her work. However, these observations do take time to manifest, and with some people, patience is not something they have, especially in a context where poverty is harsh and people are desperate for quick solutions.

Increased Hope

The presence of the project does create hope in the community and boost the community's self-image. These aspects motivate individuals to get involved in the project and hopefully become innovators in the project, which forms part of the SLL long term plans. Furthermore, as people become more involved they feel a sense of being a part of the modern society, which again boosts their self-image. This has become apparent in those individuals who have been showing keen interest to learn new ICT skills.

For some community members, having the sense of hope that increased skill will open new doors of opportunity, and increasing their pool of choices, encourages them to try and make a difference in their lives. Furthermore, the SLL helped open new opportunities for teachers to get further training through the Advanced Certificate of Education (ACE) programme. This was an opportunity to once again improve teaching skills and equip teachers with basic skills on how to teach using technology and, therefore, transfer those computer skills to learners.

4.2.3 Summary of Outcome and Impact – Strategic Value

Table 2, outlines a summary of the outcomes and impacts for the "Strategic Value" theme. The findings from Strategic Value do not incorporate any impacts. The assessment of Strategic Value gives rise to findings that are observable as a direct result of the project. Therefore, they represent the immediate effects (outcomes) of the SLL services on the community. These findings are associated with the short term changes that are taking place in the community with the aim of achieving desirable development goals. Overtime these outcomes result in long term impacts that are observed through the assessment of Empowerment and Livelihoods.

Table 2: Summary of findings-Strategic Value

Outcome		Outcome Type	Outcome Expectation
Skills Development	ICT literacy skills	Positive	Expected
	ICT Maintenance skills	Positive	Expected
	Minimal contact for literacy training	Negative	Unexpected
	Exposure to computers and computer literacy	Positive	Expected
Knowledge and Awareness	Awareness of different possibilities of technology	Positive	Unexpected
	Awareness of the services offered by the SLL	Positive	Expected
	Seeking advice from SLL project team	Positive	Unexpected
	Language barriers to effective learning	Negative	Unexpected
	Limited contextualised ICT literacy	Negative	Unexpected
	Limited knowledge of the SLL	Negative	Unexpected
Motivation	Motivated to improve ICT skills	Positive	Expected
Attitude and Behaviour	Keen interest to learn	Positive	Expected
	Increased hope in poverty alleviation	Positive	Unexpected

4.3 Empowerment

4.3.1 Purpose

Empowerment can be seen as the ability to positively transform people's lives. It involves expanding people's knowledge, enhancing people's confidence, enhancing their decision making, and enhancing their access to and management of resources. Alsop, Bertelsen and Holland (2006: 1) define empowerment as:

> *"The process of enhancing an individual's or group's capacity to make purposive choices and to transform those choices into desired actions and outcomes."*

This capacity to make and transform choices is influenced by two factors, namely agency and opportunity structure (Alsop et al., 2006: 10). *Agency* involves making intentional choices and having the ability to bargain with institutions in the market, civil society and the state. People's choices and capacity to make choices is influenced by the *opportunity structure* which influences people's ability to transform their choices into action (Alsop et al., 2006:

11; Gigler, 2004: 7). Together agency and opportunity structure have the potential to bring about different levels of empowerment.

The fundamentals of empowerment are reflected in Sen's capability approach, whereby, human development is viewed as expanding people's capabilities and achievements. This includes expanding what people are capable of doing and being given the resources they have available (Sen, 2013). In order to evaluate the effects of ICT4D towards the empowerment of people, one needs to understand how information and knowledge enhances individual and collective capabilities to achieve improved economic, social and political opportunities, and therefore, a better lifestyle (Gigler, 2004: 9; Grunfeld, 2007: 10). Such an approach relies on the basis that the capability of individuals and groups to achieve a lifestyle of value is influenced by their resources (capitals) of which "informational capital" is a part (Gigler, 2004: 9). Therefore, information can act as an agent to strengthen people's assets in multiple ways (Alsop et al., 2006: 17; Gigler, 2004: 9; World Bank Group, 2012: 41). It is suggested that ICT4D programs should assess whether ICTs have enhanced people's lifestyles through either strengthening their *informational, social, and human capabilities* (Gigler, 2004: 13). These three capabilities make up the sub-themes for Empowerment.

4.3.2 Informational Capabilities

Informational capabilities seek to understand the extent at which ICTs enhance people's informational assets. An assessment of informational capabilities is important seeing that strengthening informational capabilities can strengthen other forms of capabilities to achieve a lifestyle of value. Data on information literacy, use of information, and production of information by community members is useful to understand whether one's informational capabilities have been enhanced (Gigler, 2004: 14; Wieman, Gast, Hagen, and Van der Krogt, 2001: 10).

A) Opportunities

4.3.2.1 Access to information and decision making

Outcomes: Decision Making

Community members make use of the Internet to access information, which they feel is useful in their decision making, see Figure 6. 74.7% of respondents (28.7% strongly agree, while 46.0% agree) have indicated that taking part in the training and using computer

facilities at the schools has assisted them in making informed decisions, such as, which school or university learners can apply to.

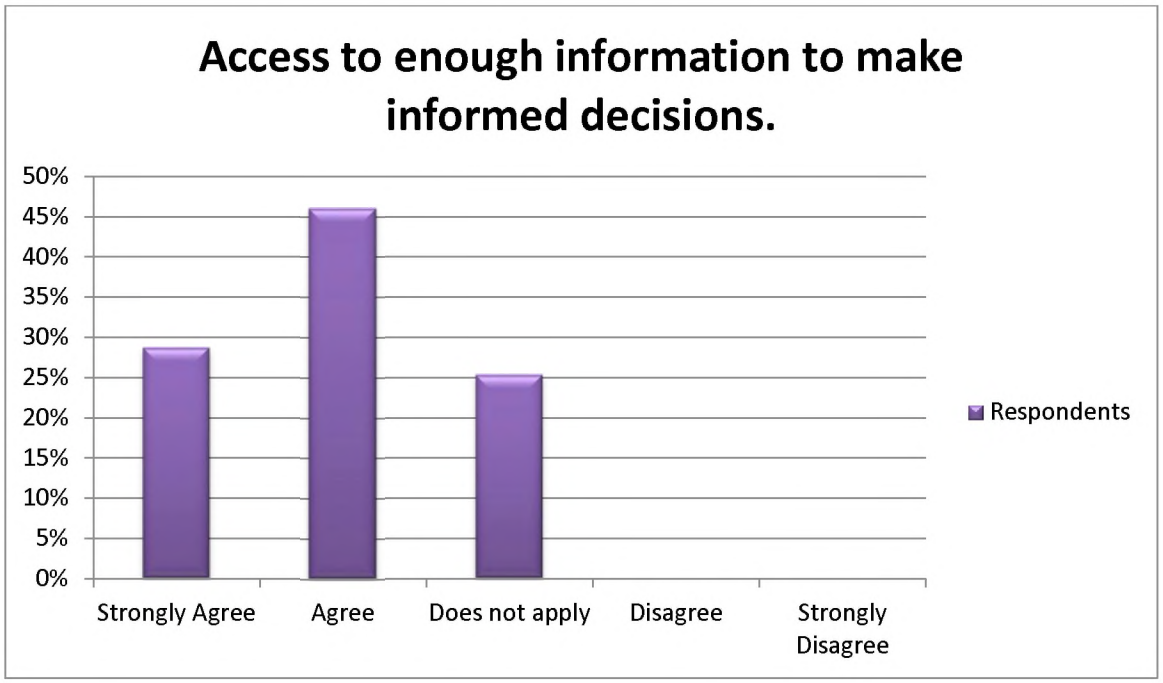


Figure 6: Accessing sufficient information for decision making

Community members not only feel that they are able to make informed decisions; they are also able to make better decisions. Of the total respondents, 73% believe that being able to access information and knowledge through the SLL helps them make better decisions in general. Of these respondents, 36.8% strongly agree, while 36.8% agree that they are able to access information which aids in better decision making.

Community members have been given the opportunity to access diverse information, which has increased their pool of choices for decision making. They have been given the option to make better decisions by having access to information. However, not everyone acts upon that opportunity. 25.2 % of the total respondents felt indifferent towards accessing information for better decision making. Despite being indifferent they, however, indicated that the project has assisted them in accessing sufficient information to make informed decisions. For example, one community member indicated that they have become more informed on healthy food options, as they mentioned: "*computers help me a lot because I know how to know more about healthy foods*". Therefore, choices have become available to access information to assist one's decision making, yet not all community members may act on those choices

(Alsop, Bertlesen and Holland, 2006). As depicted in Figure 7, only one respondent disagrees with accessing information via the Internet to make better decisions.

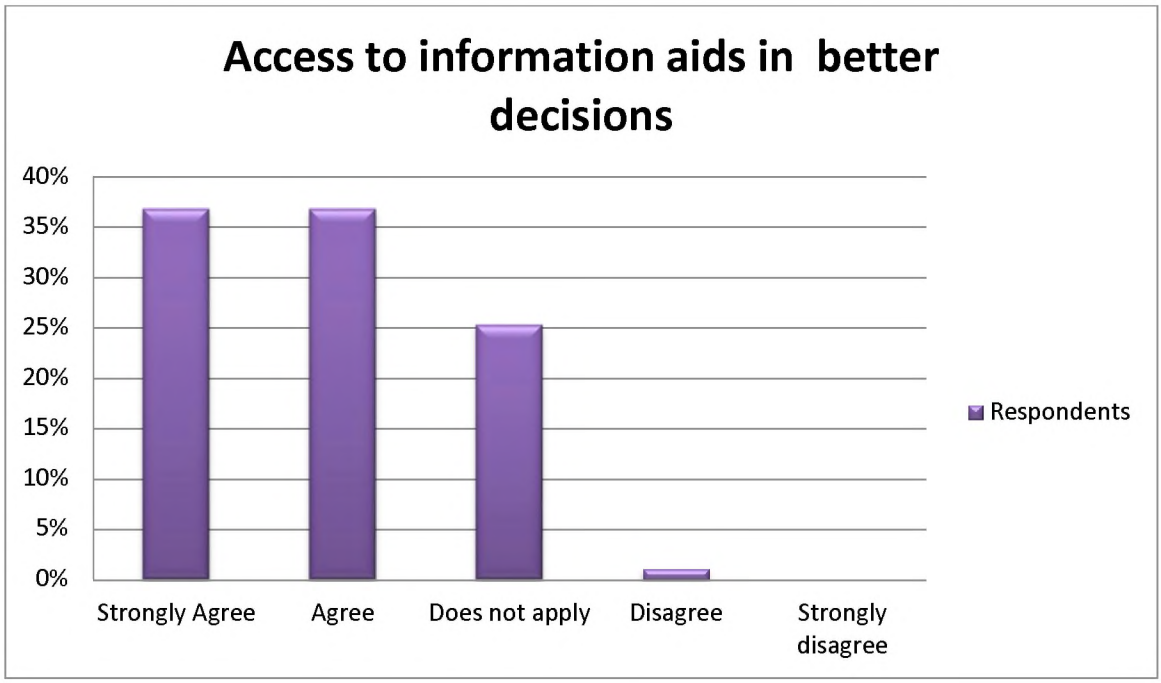


Figure 7: Access to information and better decision making

Impacts: Decision Making

Management of resources

Access to information for decision making has assisted community members with the management of their resources. Community members, especially the teachers at the school, have enhanced their skills to coordinate school events and better management of their financial resources. This has become possible as a result of accessing more information to make informed decisions. A teacher at Ngwane explained that it was useful to have access to the Internet to help him decide where best to purchase a gearbox for his vehicle. He found that he was able to compare prices from various dealerships around the country and also find out different courier options to acquire the gearbox. Another example, is when the school learners at Ngwane JSS had a school tour to Durban. The teachers organising the trip had to locate an affordable place to make bookings. In this case the decision making process was made easier for making arrangements for the school trip. They could compare prices more effectively, and also take into account logistics for the trip with the use of information accessed via the Internet. Furthermore, it aided in terms of deciding the appropriate means of making the payments at the time.

4.3.2.2 Communication flows in the community

Outcomes: Communication Flow

People are now challenged to make use of these ways of communication to communicate with those far away. High school learners have indicated that through the project they are able to access online forms for university application. They do not have to travel to town to access application forms, or travel to the universities to apply. Furthermore, they do not have to rely on friends in major towns for application forms. By applying online, they can also monitor their applications online. Similarly, teachers do not have to travel into town (about 2 hours away) to transmit progress reports to the Department of Education. Teachers and principals can now email these reports to the Department of Education. Furthermore, there is pressure from the Department of Education to submit typed reports rather than hand written reports, as was the case in the past. Due to this pressure, teachers are being encouraged to learn how to use technology, hence most of the teachers at schools attend the training. These teachers not only have the choice to attend training and make use of the skills taught, but their choice to attend training has also been influenced by their opportunity structure (Alsop et al., 2006; Gigler 2004). The expectation from the Department of Education (DoE) to have typed reports influences the teachers' choice to attend training (Gigler, 2004). Furthermore, teachers in the area have been provided with laptops by the Department of Education, which again influences their choice to attend training and show an interest in learning. These teachers want to be able to make use of their new laptops; as a result they attend training in the hope that they can apply their new skills at home when utilising their own laptops.

Community members frequently communicate via word of mouth, and SMS. The Baseline Study and previous assessment reports indicate that phones calls are considered expensive and are only made for emergencies or contacting far away distant relatives. Community members are now able to communicate via social media, which is no longer limited to people with smart phones. During the training, when community members are introduced to email, they become excited and begin to communicate with other community members via email. The younger generation are often quick to start using Facebook and chat with their fellow Facebook friends at a reduced price.

Community members also come to the schools to make use of the printing facilities. People print out invitation letters to various community functions, such as, the retirement farewell of the principle at Ngwane JSS in 2013. Community members also print out funeral plans and

their CVs as well, for those who seek employment. Such facilities assist community members to spread information even faster through the community. Therefore, existing communication structures are being complimented.

Impacts: Communication Flow

The use of Internet facilities complements already existing ways of communication and aids in people's way of keeping contact with those from far. Of the 87 respondents, 64% have indicated that they now use email as an additional form of communication. This has become useful as they now have an additional means of communication that does not cost them money. Furthermore, Internet facilities aid learners to reduce their cost of travelling into major towns to access application forms for University. Moreover, teachers at the school reduce their time and travelling costs to the Department of Education, as they now communicate via email and can send their school reports via email. The time reduced from travelling to the nearest town to submit DoE reports can now be allocated to other activities.

As indicated in the interviews conducted, community members also make use of online free SMS platforms that are provided by MTN and the Vodacom networks in South Africa. Having access to such facilities does assist community members to further cut down on costs on SMS. However, word of mouth still appears to be the most used form of traditional communication in the community.

B) Shortcomings

Community members and, more specifically, teachers have been given the opportunity to enhance their informational literacy skills. They have been equipped with the ability to access information via the Internet. However, informational literacy goes beyond accessing information. It requires one to be able to evaluate information, process information and incorporate it into ones knowledge base (Gigler 2004, Wieman, Gast, Hagen, and Van der Krogt, 2001). Consequently, what often happens is that community members have the skills to access information, such as searching websites, yet they do not necessarily have the ability to process that information in order to make effective use of it. It has been observed that community members do not always understand the information that they have accessed due to language barriers. Furthermore, they are not always aware of how to identify different sources of information, and disseminate that information.

It has been observed that it is usually teachers at the school who are able to effectively make use of information accessed and identify different sources of information. Most teachers in

the area do speak English and are able to make sense of some of the information they do access from the Internet.

Informational literacy also involves the ability to generate and create content (Gigler 2004, Wieman, Gast, Hagen, and Van der Krogt, 2001). However, very few community members create their own content. Even the teachers who have frequent access to the labs rarely generate their own content. It is only in some cases, whereby teachers incorporate material from the Internet, and their own materials to enhance their teaching, do they generate content. This has been the case with teachers who showed enthusiasm about their teaching and have limited materials (such as textbooks) on the content they would like to teach. One observed reason for community members not creating their own content is that they are not aware of how to do so, and they do not see a need to do so. Consequently, despite having the choice to make their own content, that choice has been limited by the lack of skill or knowledge on how to generate their own content. Therefore, the choice to create new content cannot be acted upon (Alsop et al., 2006; Gigler, 2004).

4.3.3 Human Capabilities

ICTs have multiple effects on people's human capabilities (economic, political, cultural, and human capital). People have been empowered to make a choice to use their basic computer literacy skills, to enhance their power over different areas in their lives (Alsop et al., 2006; Gigler, 2004; World Bank Group, 2012). Community members have been able to utilise information from the Internet to assist them in their regular tasks, such as: improving their understanding of material to be taught in class, solving class assignments, and gaining confidence in their abilities. Such activities contribute to the empowerment of people. Therefore, information is acting as an agent to strengthening people's assets, especially their psychological assets, such as, increased confidence in their abilities. This influences their choices to utilise their new basic computer skills in multiple ways (Alsop et al., 2006; Gigler, 2004; World Bank Group, 2012).

It is important to assess the actual and realised uses of ICTs. It is useful to understand user behaviour and perceptions, and motivation for using ICTs, in order to understand whether they have led to an improvement in people's human capabilities. Human capabilities assess the extent to which ICTs: facilitate and support the capacity to solve problems, strengthen ICT skills and knowledge, strengthen the ability to interact with the market at the local level

and different areas of society, improve one's involvement in decision making at the community level, and strengthen people's cultural identity (Gigler, 2004: 15).

4.3.3.1 Confidence in ICT skills

A) Opportunities

Outcomes: Confidence in ICT skills

More than half of the respondents (49.4% agree and 20.7% strongly agree) feel that the SLL has given them an opportunity to utilise their computer literacy skills to perform basic computer tasks, see Figure 8. They feel confident enough that they are able to complete basic tasks and access information as expected by the SLL facilitators. This has been observed to be a barrier that needed overcoming, in order for community members to experience some form of impact in the community. 26.4% of the respondents felt indifferent about the computer skills they have acquired. They felt that their abilities have not changed after having taken part in the programme. It has been observed that one training course is not sufficient for community members. As a result, some community members attend more than one training course to improve their computer skills set. After one course of training, community members become familiar with the technology. A second course of training is then needed to practice and apply their skills. This has been a case of some who have successfully benefitted from the programme. 46% of respondents agree while 19.5% strongly agree that they feel more confident in their abilities and are satisfied with themselves when using computer facilities at the school, given the training they have received. Only 31 % of the respondents were unsure of their computer literacy abilities after having taken part in the programme.

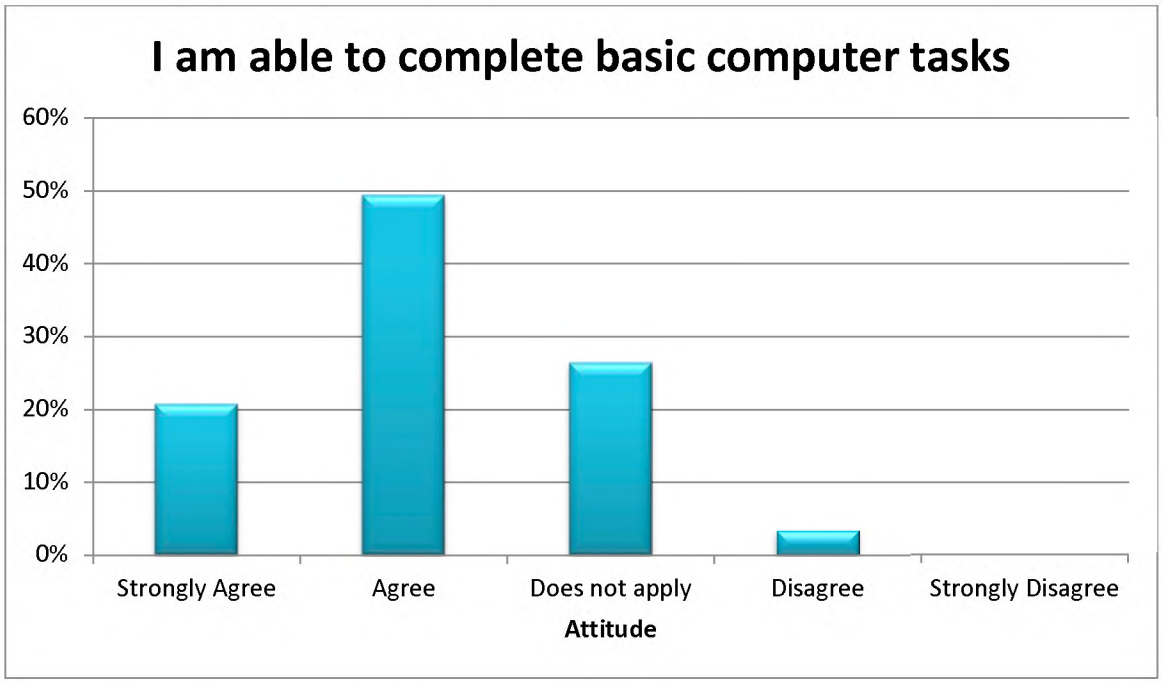


Figure 8: I am able to complete basic computer tasks.

Impacts: Confidence in ICT skills

After attending the training offered, community members tend to feel more confident in their abilities. It has been observed that the more confident they are in their abilities the more they tend to explore with technology and try to apply their skills to their own personal context. For example, there is a community member who started her own cosmetic business in the area, as a result of taking part in the programme. She attended the training twice to really explore and understand what was being taught. As her confidence grew she then assisted other community members during the training and began using her skills to seek employment. As a result, she came across an opportunity online to start her own business.

B) Shortcomings

Not all community members who attend training attend consistently, which influences their confidence in their ICT skills. It has been observed that some people attend only when they manage to get transport to the training venues and when the weather is calm. During heavy rains the attendance rate drops as roads become muddy, making it difficult to travel to the training points. Furthermore, heavy rains have also resulted in power failure in the area. As a result, training is hindered and at times has to be postponed until power is restored and the machines have rebooted as expected. Community members also become discouraged when there are technical problems at the training centre. Due to various reasons, the equipment malfunctions and training has to be delayed. Therefore, people feel that they have travelled a

long distance to the schools only to find out that there is a technical problem and they will have to wait before training can commence. Consequently, these various hiccups in training affected some peoples' learning process.

4.3.3.2 Access to information and Problem solving

A) Opportunities

Outcomes: Problem solving

Having access to computer facilities through the SLL has assisted community members, more especially the schools, with basic problem solving. Through access to information, project recipients are able to search for information around different issues they are facing. They are also able to search for information on possible solutions, or communicate with different entities that can provide alternative solutions to their problems. One community member indicated that:

> "*We work together when we have problems using the computer to solve the problem through letters or messages*"

As noted previously, access to information through the SLL has resulted in problem solving benefits from a school perspective with minimal examples being exhibited from a community context. Within the schools, access to information has supported the education process, especially the various difficulties the schools face, such as limited access to educational materials. Moreover, teachers at the schools and school learners have been able to access information that assists them in their learning process. For example, learners from the school often access the Internet to complete their research assignments and enhance their understanding of assignment/research topics. Furthermore, as three of the teachers indicated (two from Ngwane and one from Nqabara), teachers are able to research their subject content in order to teach more effectively. This becomes useful in cases were a teacher is not well versed in a particular subject matter.

It was found that 34.4% of community members strongly agree, while 33.3% of community members agree that they have been able to access information to assist them in their problem solving; see Figure 9. By accessing information online, they indicated that they have gained an improved understanding of problems or challenges they may be faced with. This response rate comprised of users who were actively involved in the SLL, users who accessed the project facilities on a daily to weekly basis. It was noted that Community members found the

computer facilities as an alternative and cheap means of communicating their problems. Relaying problems to various government departments has been one particular popular case of communication that community members made use of. For example, one community woman mentioned:

> "*The computers help me because I can contact home affairs when I have trouble with my children's certificates.*"

Impacts: Problem Solving

Due to a shortage of staff at the schools in this area, some teachers are tasked with teaching subjects where they have not received any formal training. As a result, teachers are able to equip themselves with the necessary subject knowledge through online materials. Teachers are then able to reduce the pressure of being faced with 'foreign' subjects they are tasked to teach. For example, the social science teacher at Ngwane has to teach Geography, History and Biology. When teaching Biology, he is able to access information, via the Internet, on Biology content, as outlined in the curriculum. He is also able to understand concepts better and find useful examples to demonstrate to the class. Alternatively, learners have been able to access YouTube videos and learn and acquire more understanding on various topics. The YouTube videos help augment what they are already learning. As one teacher indicated, *"access to Internet helps develop the minds of learners"*.

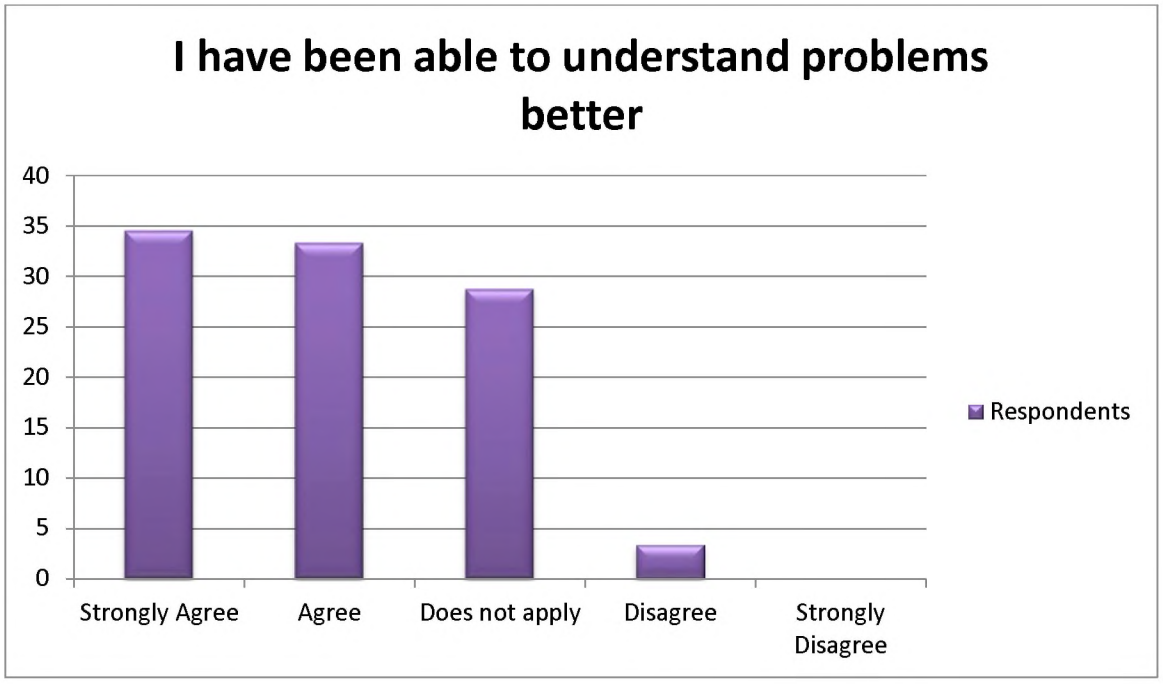


Figure 9: I have been able to understand problems better.

Despite the view that through the SLL people have been able to solve problems, the majority of respondents do not see the SLL as a means of communicating those problems or community challenges. Only 30.2% of respondents feel that through the SLL they are able to communicate their problems and challenges more effectively. This has been observed mainly amongst schools who communicate amongst themselves and share ideas and events. For example, through the SLL, community members have been able to liaise with the project lead to put forward their school needs and concerns to the Department of Education. There are also few cases where community members liaise with different government departments to resolve issues to do with their personal documents such as ID documents, and birth certificates. For example, one community member indicated:

> "*The computer helped me because I was having trouble getting an identity document and got in touch with the Department of Home Affairs and received assistance*".

Other instances from the community include:

Respondent a. *"My brother had the trouble/ a problem with getting a social grant and because he had knowledge of how to use the computer, he got in touch with the department of social affairs and received assistance because of the computer".*

Respondent b. *"The computer helped us because we had a problem, the road was halved and we contacted the department of roads through the computer and received assistance".*

B) Shortcomings

Although learners access YouTube videos and various materials for their assignments, the content that is accessed is not always useful. For instance, learners have been able to access illicit adult content. On one of the training sessions, one of the facilitators logged onto a computer and the first site that appeared was adult content. In this case, the previous user had not logged off the machine appropriately. Therefore, the websites they were visiting were still open. These computers are also accessed by school learners, who become exposed to pornography. As one survey respondent mentioned:

> "*Children are able to go into the Internet and look at things that they shouldn't be looking at, such things that have to do with sex*".

4.3.3.3 Enhanced Community Image

A) Opportunities

Outcomes: Community Image

Perceived improvement in educational needs

Since the start of the project, Ngwane has been in the limelight. As some teachers indicated, the school has become popular among the community members. Learners want to go to that particular school because there are computers. Learners (young people) are particularly curious and want to learn and play with these "gadgets". Furthermore, as more community members learn about the project, the training centres have started to become community hubs, where people from different areas come together to attend training. This was seen to give the school a good image and the impression that it is more advanced than other schools in the area.

There is a perception in the community that the standard of the schools within the SLL is now higher, given that they are offering computer lessons. Parents have a sense that their children are benefiting and that the level of education at the schools has improved. There is an expectation that the school is performing well. As the SLL is being shown on local television, "*then the school must be doing well*", as one community member commented. Therefore, learners who attend these schools are expected to know more than other schools and are expected to perform better than other schools. There is also a view that school learners will not find it difficult to transition to university, as they are exposed to more learning opportunities with Internet access and computer skills.

The school has been receiving visits from different organisations – TV presenters and radio presenters, as the project is being promoted. As indicated by the project champion at Ngwane, the Dwesa area and "*Ngwane JSS has become exposed and known by the outside world*". Community members feel like they are now worth more, given they are gaining or have gained computer skills. They feel like they are now at the same level as those in urban areas and those who went through formal schooling or further studies. There is an increased hope that the socio-economic state of the community will change and improve, given the new computer skills that community members are acquiring.

Self-Image

Community members have shown their excitement in learning about computers and how to use them. They feel excited that they have an opportunity to learn a new skill that they

previously did not have. There has been hype created around the SLL and people have been keen to be a part of the programme and not feel left out. Of the total respondents, 28.7% of respondents strongly agree and 36.7% agree that the training offered has helped them have a more positive image of themselves, see Figure 10. They feel that because they are being equipped with new skills, they can now be a part of the "technology" trend which is often spoken about in the community.

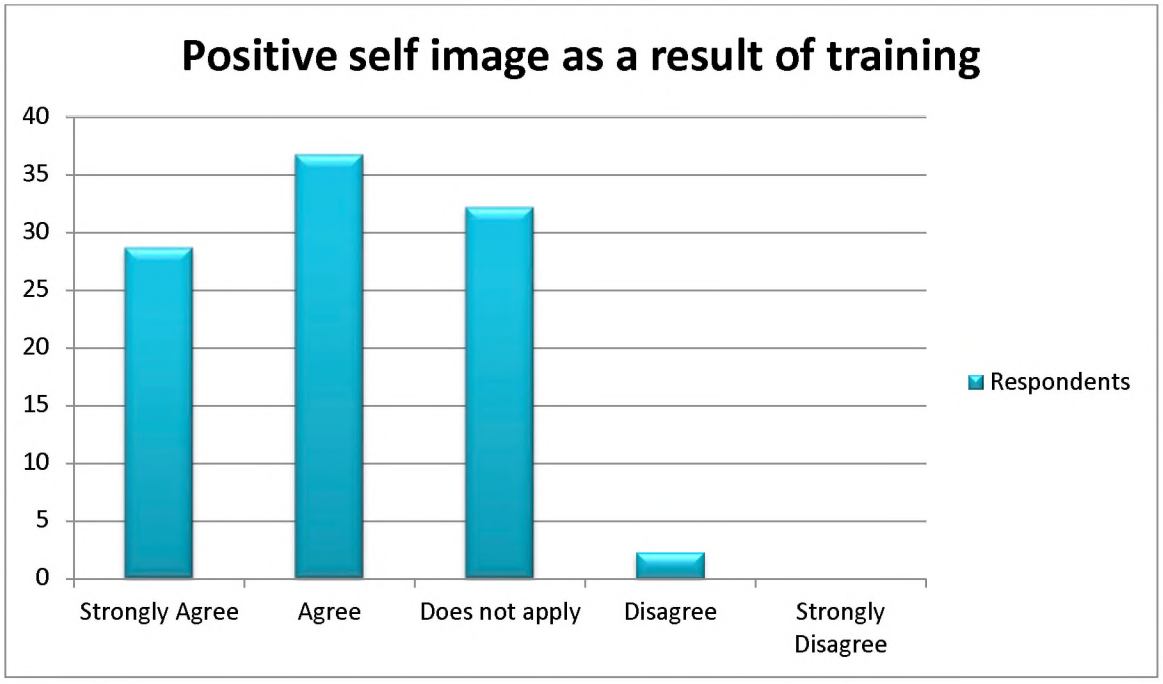


Figure 10: Positive self-image as a result of training

Furthermore, the majority of community members have indicated that, taking part in the SLL has not negatively affected their sense of self-worth. 97.6% of respondents (44.8% does not apply and 52.8% disagree) are against the view that, using the computer services available, or attending computer literacy training, makes them feel inadequate, see Figure 11.

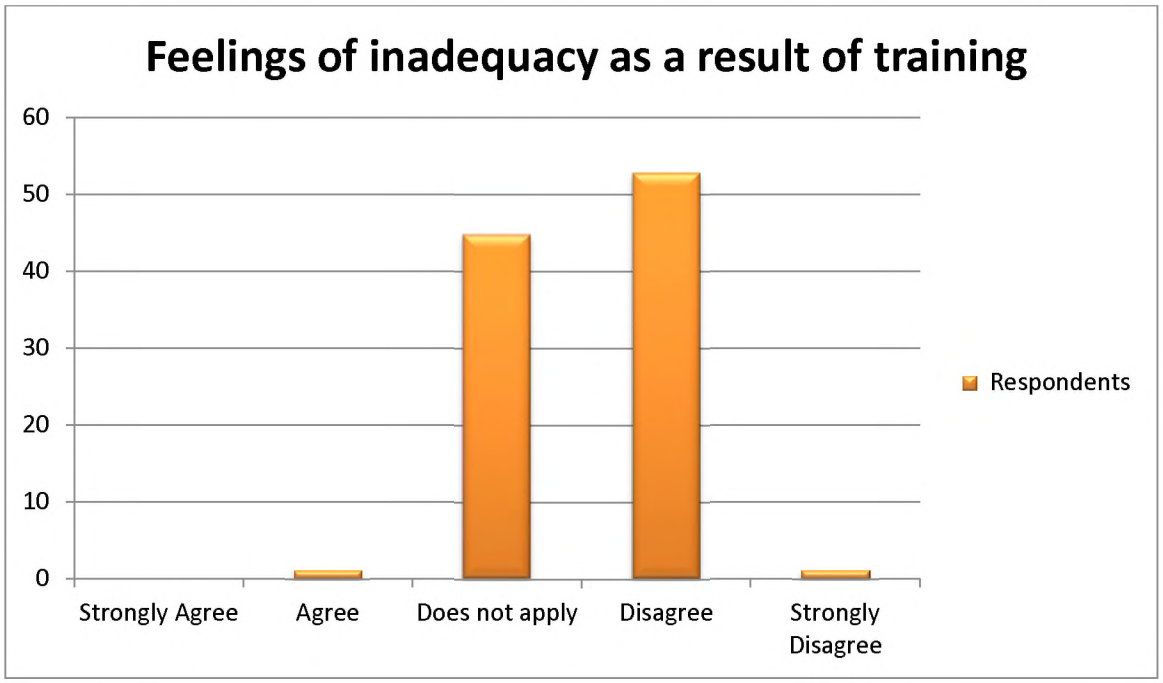


Figure 11: Feelings of inadequacy as a result of training.

ICT literacy and Personal Achievement

For many community members, taking part in the training has left them with a sense of accomplishment. It was observed that during training, gaining a certificate is a proud moment for community members. Community members have been determined to gain a certificate, indicating that they have completed a computer literacy course. They feel proud that they have achieved something that they initially did not imagine happening. From the survey, more that 50% (57.4% disagree and 2.3% strongly disagree) of the respondents were satisfied with their progress once the training was complete, see Figure 11. As one teacher mentioned, some schools were awarded computers by the Department of Education; however, no computer training was offered. Instead the computers were locked up and stored away, as no one knew how to use them. With the presence of the SLL, they can now make use of the facilities, which is an exciting achievement for many teachers at the schools. The schools in Dwesa did not perceive that they would one day be able to use these machines and know how to operate them.



Figure 12: Not proud about oneself as a result of the training.

Publicity to outside world

A second significant feature that has stood out for the community, due to the presence of the SLL, has been the publicity the community has gained. Different researchers have been visiting the community and working with the schools, which expose the schools to the "outside world". One teacher indicated: "*even the recent TV show it promotes the standard of our school*". The SLL has been aired on one of the South African Broadcasting Cooperation (SABC) shows and it has had some mention on radio and a few local newspapers. This form of exposure and promotion of the project has filtered through to the community, whereby schools involved in the project are perceived to be of a higher standard. Community members become excited when they read about their community in the papers or when they get interviewed about the SLL on television. This creates a sense of importance for the community, which supports the view that it is considered to be a significant change in the community.

Impacts: Community Image

Neighbouring schools are now bringing their teachers and learners to learn at Ngwane so that they too can have access to these computer facilities that people are talking about. This is a continued perception that people have, because the schools which form part of the project appear to be gaining more attention. There is a perception that, because the schools are now more known and are in the limelight, they will gain assistance, or there is a higher possibility

that their needs will be met. In light of the above, there is hope in the community that more change is coming. For example, one community member indicated that when she saw the children on television she was very pleased (Expressing both a sense of pride) saying that "even people from foreign countries will know about Ngwane".

B) Shortcomings

2.3% of the respondents indicated that they felt hopeless when they took part in the computer literacy training offered. One respondent further indicated that, they did not enjoy the training offered. This was due to the frustration they experienced during the training. During the training it has been occasionally observed that when people lag behind and become impatient with the learning process they tend to become frustrated with the training overall.

3.4% of the total respondents indicated that the training itself made them feel disappointed. This could be a result of failing to understand or grasp the concepts taught during the training. This could further have been a result of poor performance during the assessments conducted as part of the training, for example, the class exercises and tests provided. Despite the three respondents who felt disappointed, as a result of the training, 55% of the total respondents do not feel this way. A minority of respondents, especially school teachers, feel that the content online is too advanced for them to understand. For most teachers, the training they had obtained in the past is no longer sufficient for teaching. They now have to advance their skills; however, they feel that they are unable to understand the academic content from the Internet.

4.3.4 Social Capabilities

A key dimension of community empowerment is enhanced social capabilities. Assessing social capabilities encompasses similar dimensions to that of human capabilities at a much broader perspective that incorporates the community. Poor communities at times gain power through forming groups and attaining a shared vision and goal (Gigler, 2004: 16). Social capabilities assess the extent to which access to and quality of basic services has improved, economic opportunities have been promoted, participation in the political system has improved, and whether the community's identity has been enhanced (Gigler, 2004: 19).

Information has been used as an agent to strengthen the community's networks and ways of interaction. People have been provided with added channels of communication. The training that is offered by the SLL has opened a different platform for community members to get together and interact. Furthermore, it has opened opportunities to find out what is happening

in different parts of the community. Such opportunities have empowered people to explore new ways of communication in the area (Also et al., 2006; Gigler, 2004; World Bank Group, 2012). Community members are slowly becoming more aware of the different ways to utilise technology to complement their regular activities. Although the use of ICTs has the potential of enhancing people's capabilities to make economic choices, the community of Dwesa has been quite limited in this regard. They have gained basic skills on how to access information. However, their power to bargain with government services and their ability to see the extent to which information can act as an agent to transform their lives, is still lacking. Therefore, most community members have not been able to act on the opportunities that have opened up (Alsop et al., 2006; Gigler, 2004; World Bank Group, 2012). Furthermore, the community has more options in terms of ways to engage politically and share their cultural identity; however for many, these options have not been explored. For some, the economic poverty is large to the extent that they do not see a need to engage in cultural or political matters until their need for finding employment has been satisfied. Therefore, the context in which they stay has an influence on the ability to act upon these new opportunities that are opened and achieve desired results (Gigler, 2004).

A) Opportunities

4.3.4.1 Community Interaction Outcomes

The SLL has opened new channels of interaction in the community, whereby people from different parts of the community come together for training. 58.6% of respondents agree, while 12.6% strongly agree that taking part in the project helps them feel like they are part of a much bigger community goal. The project is widespread and hype has been created around it. As a result, many community members are getting involved and, therefore, they feel part of the community. Only 1 respondent disagrees with this notion. They however, did not indicate why they disagree.

The SLL has been an opportunity for people to get to know each other and meet others within the broader community. 73.5% of the respondents feel that they are able to interact and work together with other community members, as a result of being involved in the project, see Figure 14. None of the respondents disagreed that the SLL was an opportunity to engage with fellow community members. 57.6% of the respondents (see Figure 13) found that through the SLL the two communities, from which data was collected, have been working together.

People from both Ngwane and Nqabara, come together to attend training and, thus, have an opportunity to engage and network. As one community member mentioned:

> "*... it has helped because we learned how to approach other people e.g. when in class and if we want information on something we can always ask for assistance from other people who reside in their places and also in class we learn to work with others and help each other with anything.*"

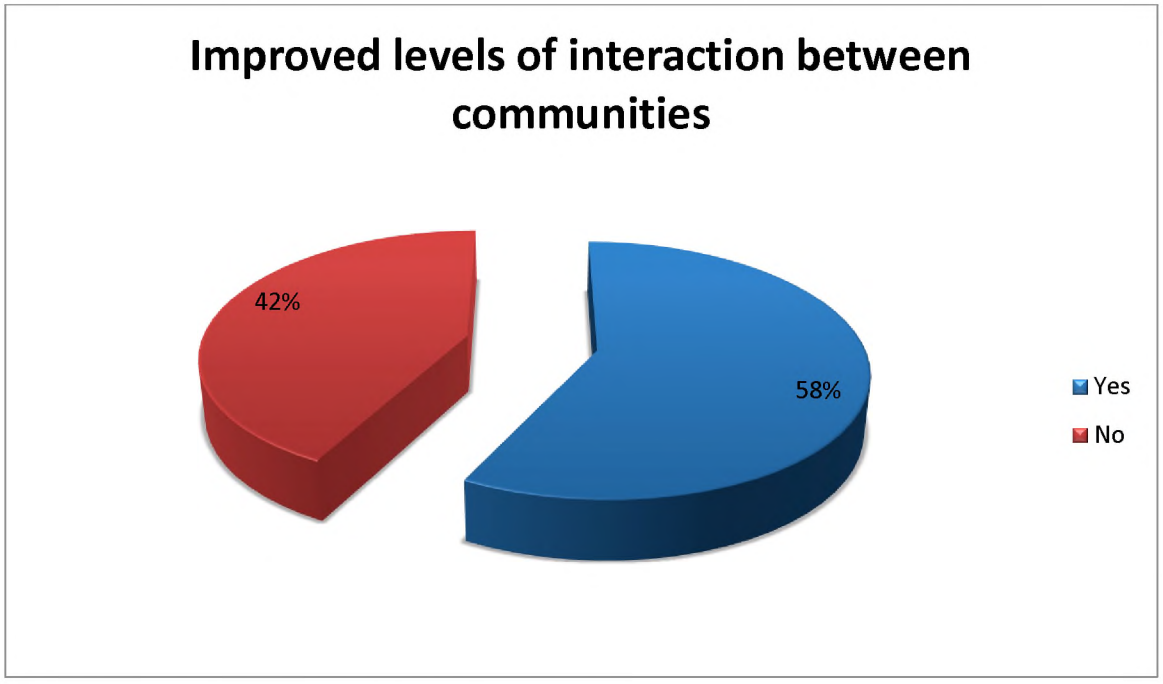


Figure 13: Increased interaction between communities

Community interaction amongst the different schools and the teachers has been the most visible in the community. The SLL has linked 16 schools together through the Wimax network available. As the training occurs at three distinct schools, teachers from different schools come together at these central points and they get to know each other. Teachers from these different schools have been coming together for the training and engage during the training. Furthermore, each school is set up with an IP phone, whereby schools can now communicate more regularly. Schools have been able to contact one another and assist one another with problems around the training sessions, or with technical problems, such as the network being down. Such opportunities have paved way for teachers to engage even on an academic level. Teachers now contact each other to talk about their subject content and assist each other in similar subject areas. Teachers are also at a stage where they know what is

happening in the different schools. They share ideas and resolve issues on a broader scale rather than having each school managing alone.

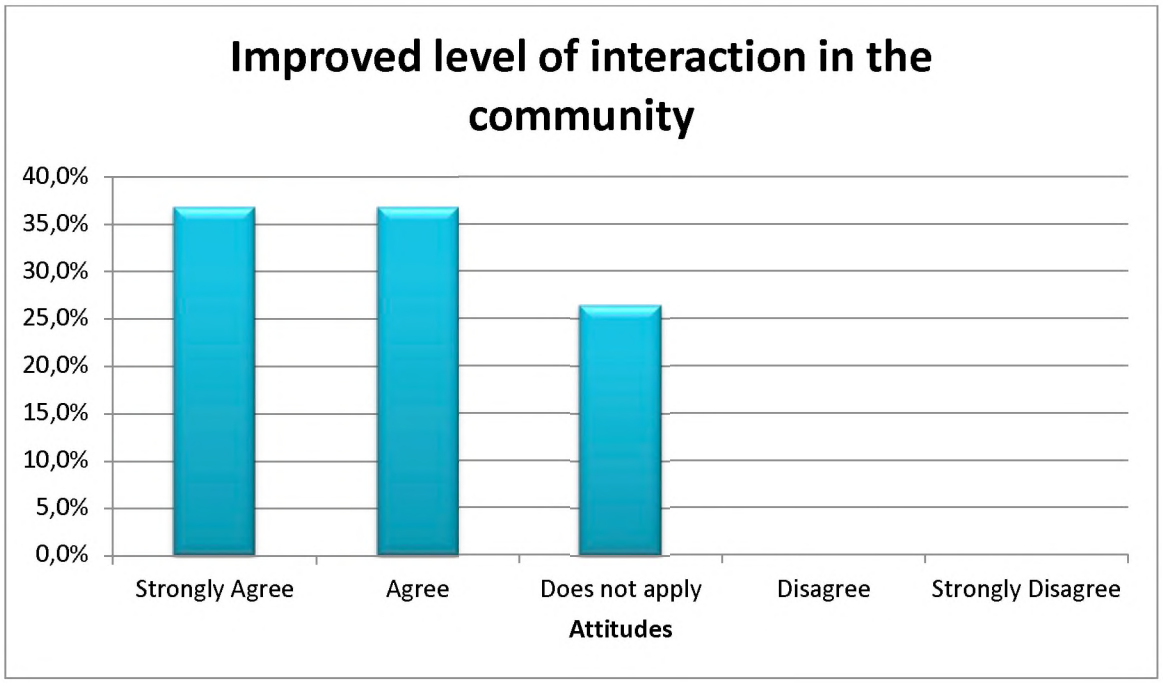


Figure 14: Improved level of interaction in the community.

4.3.4.2 Awareness of events in the community

A) **Opportunities**

Outcomes: Community awareness

As people have been able to interact during the training, they feel more aware of what is happening in the community, and more especially in the schools. 72.4% of the respondents feel that the SLL has assisted them with being more aware of what is happening in the community, see Figure 15 and 16. There have been occasions whereby, after a training session, community members and or teachers make use of training opportunities, to make announcements to the rest of the community. Community members then convey such announcements, to notify people in their immediate surroundings. The youth also make use of social media to find out what is happening in other parts of the country. It has been observed, however, that this is only common with the youth, who have already been exposed to some form of social media, such as Mxit or Facebook on their phones. They now merely extend this to using computers at the school to enhance their social media interactions.

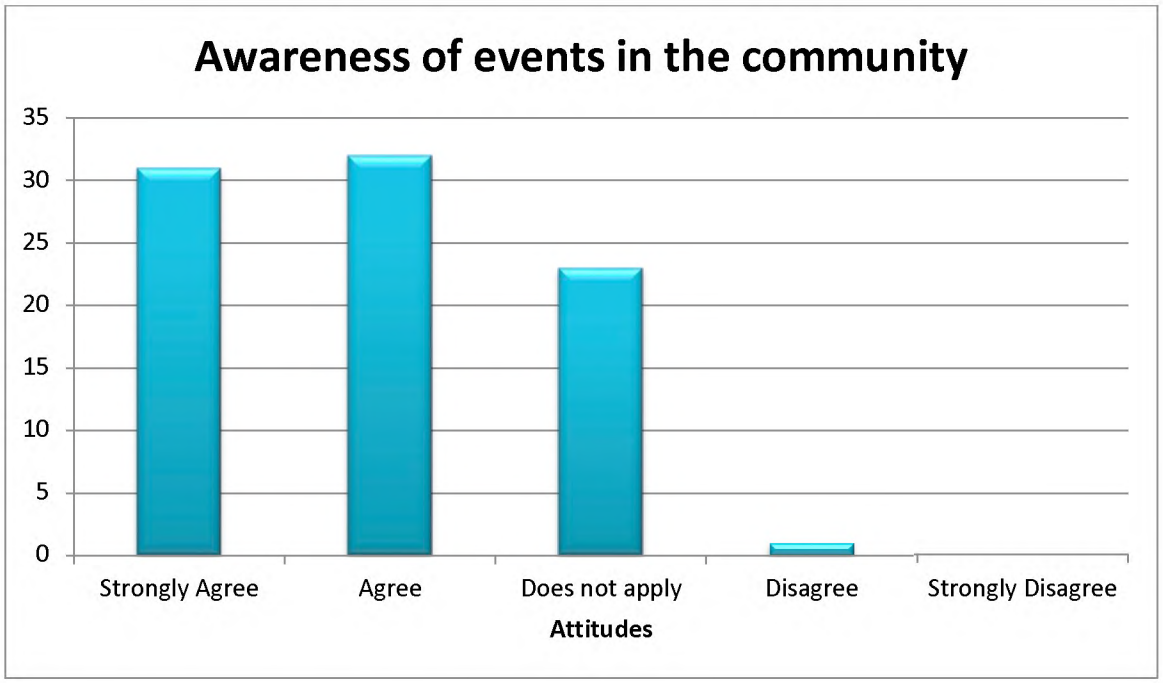


Figure 15: Awareness of events in the community.

Impact: Community awareness

Schools are now more engaged in terms of notifying each other of what is occurring at their schools. Teachers are able to keep up to date with events in different schools by communicating with each other via email and the IP phones that have been provided. For example, making notices on any events that other schools can attend and so forth.

A difference has been seen especially in the area of sports and sporting activities. The schools have a culture of having inter-sport competitions. With the SLL services offered, schools are able to effectively organise sport days for the different schools via email. They have been able to make suitable arrangements rather than having to travel to the schools in person to do so. This aids in reducing the time being spent travelling between schools, as they are far-off from one another, and it also reduces the cost of travelling between schools. Similarly, schools have been able to print flyers about sporting events at the schools and distribute these to other schools throughout the community. Distributing flyers acts as a reminder on the various activities happening at the schools. People often forget details, such as dates and times and, as a result, the distribution of flyers compliments the use of word of mouth. However, it has been observed that the most favoured means is via email and word of mouth during the computer training. This is only possible, as each school sends a representative to attend the computer training, who then conveys messages to their respective school.

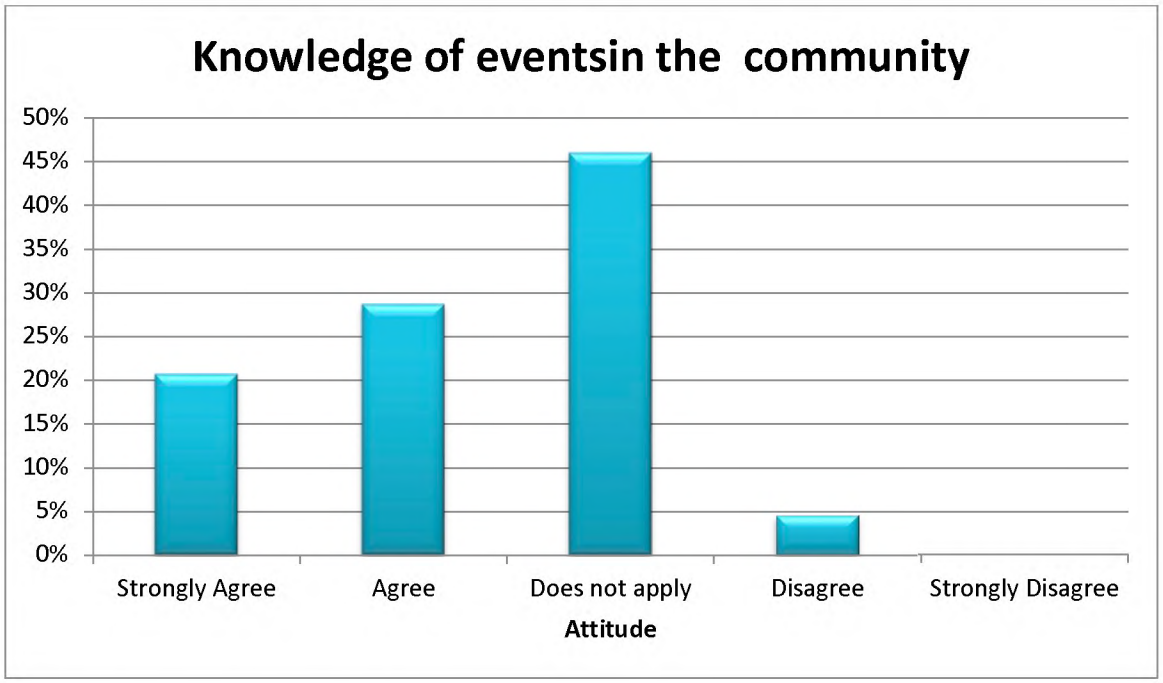


Figure 16: Knowledge of events in the community

Involvement in the project has opened some of the schools to becoming aware of the different types of technology available. Through the SLL, some people have demonstrated an interest in aspiring to know more about technology. For example, Ngwane JSS invested in a projector after realising that they would like to be able to make demonstrations on one computer for everyone tosee. This would ensure every learner has an opportunity to engage with the classroom material and view the demonstrations. The school is also making use of a scanner and printer, which makes their administrative tasks slightly easier than the way they used to. Therefore, in the long term, the SLL has given people an opportunity to become more aware of what technology can do for them.

B) Shortcomings

The schools appear to be the only part of the community that has benefited through improved awareness, in terms of being informed on various school events or activities. General community awareness on local events has not changed since the start of the SLL. 46% indifferent while 4.6% strongly disagree that there has been improvement in access to knowledge and information about events in the community, see Figure 16. Minimal information is captured online in terms of what is occurring in the community. The community itself has a limited presence online and minimal local knowledge is being generated and captured online.

4.3.4.3 Engaging with government services

A) Opportunities

Although the e-government platform is currently not operating within the SLL as hoped in the Needs Assessment Report; community members have been able to access information indirectly via various government departmental websites. 42.5% of the respondents agree that they have been enabled to get information about government departments as a result of being involved in the project. There have been individual accounts on accessing government information, which has assisted community members in various areas of their lives. The following are some examples:

- Over half the respondents (24.3% strongly agree and 36.8% agree) have been aided in accessing information on education services, such as, finding schools for learners, and accessing exam results. Students have been accessing their final matric results rather than having to travel to the nearest exam centre in town, to access their final year results. One student mentioned: "*when I was in Grade 12 I went onto the Internet to check my results by contacting the Department of Education*".
- Teachers have moved beyond merely interacting with other schools, but also engaging with the Department of Education, for example, by submitting annual school reports via email.
- Students have been able to access past exam papers and study tips from the Department of Education website.
- Parents have been able to confirm school opening and closing dates. They have also been able to inquire into the availability of schools for Grade 11 and 12 for their children. One respondent mentioned: "*…it has helped me to communicate with the Department of Education, to see school terms and how do they work and closing and opening dates of the schools to other provinces*"
- Some community members have accessed information in relation to their social grants.
- Community members have been frequently accessing the Department of Home Affairs website for:
    - Tracking passport and ID applications,
    - Registering for various certificates such as birth certificates,
    - Changing personal details on ID documents.

As one respondent mentioned: "*Yes, because I have emailed these departments to check if they had a vacant post and also to check that my ID, passport has been finished or not*"

- Community members have been able to inform the Department of Roads on damaged roads in the area.
- 48.2 % (21.8% strongly agree and 26.4% agree) of respondents feel that through the SLL there has been improved knowledge on health services in the community. For example, one of the HIV/AIDS community care workers has been able to access more information on HIV/AIDS and gain more insight about the disease and help people more effectively. Through the project she is able to access up to date information about the disease and ways of assisting community members affected and infected by HIV/AIDS. Nonetheless, a large percentage of respondents (46%) do not see any health benefits of accessing information through the living lab project nor have they accessed increased knowledge on the health services in the community. For many community members, it was observed that they are not aware that they can access different kinds of useful information, such as information on health and health services.

4.3.4.4 Generation of income

A) Opportunities

Outcome: Income generation

Access to information has had some effect on the economic status of community members. Access to Internet facilities has assisted certain community members with buying and selling goods more effectively. 52.8% of respondents (11.5% strongly agree and 41.3% agree) have been able to conduct online business, as a result of taking part in the programme, see Figure 17. They indicated that they have been able to buy and sell goods effectively. Of these respondents 34.5% are unemployed. However, they have been able to make informed purchasing decisions. They have been able to acquire goods through online business. An example would be the teacher who ordered a gearbox online for his car. Therefore, making more informed purchasing decisions. As for the 11.5% who strongly agree, the majority are employed and have been able to market their goods online. For example, one community woman indicated:

"I am selling bags. I always take photos every time when I have new stock and put it on my computer and send to people through email".

From the responses given only 5.7% of respondents do not see a relationship between accessing information and being able to buy and sell goods in a better way.

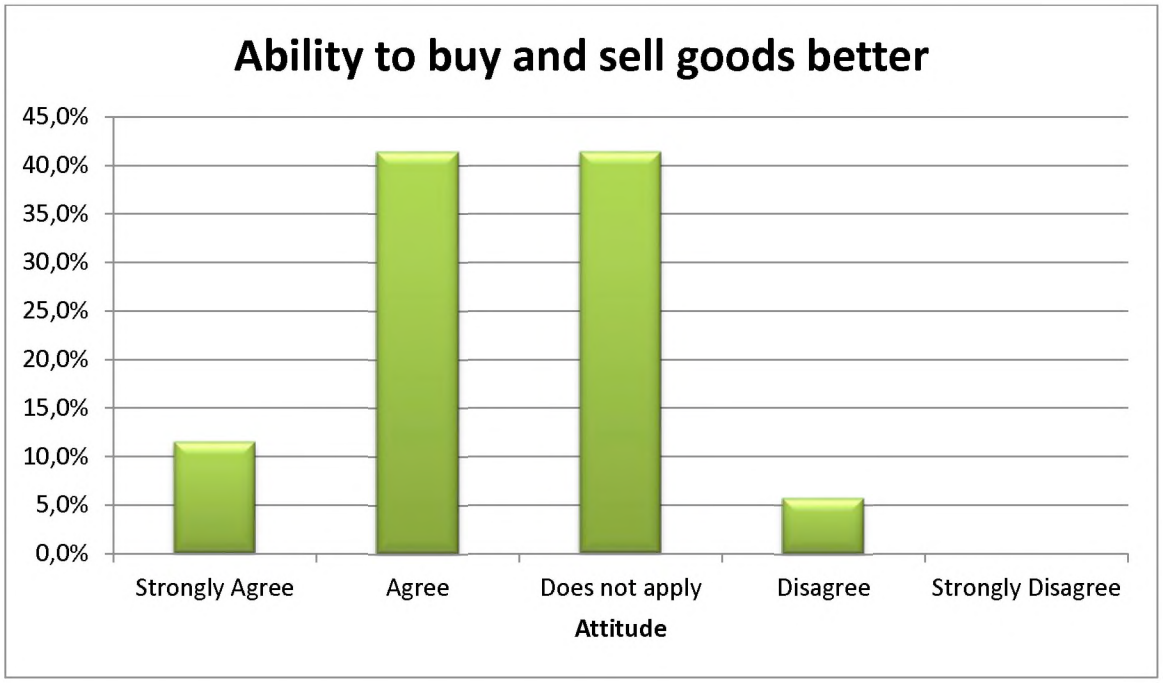


Figure 17: Ability to buy and sell goods better.

Impact: Income generation

Only 25.6% of respondents have indicated that through the project they have been able to make money or perform their work more effectively. For example, there are individual cases where people have started their own business as a result of being involved in the project. Very few community members have had the capacity to make use of their skills to market their business products online. For instance, the one community member who started selling cosmetics products created a Facebook page for her business to market her goods. She not only made use of the choice to market her goods using the skills she acquired, but she was able to achieve the desired outcomes of her choice (Gigler, 2004).

82.8% of respondents view that there has been no change in their income as a result of the project. This has been the case despite having access to computer services and the ability to access information. With the few who have been able to leverage their newly acquired computer literacy skills, they have seen an increase in their income. Furthermore, community members have been able to cut their costs in terms of communication and buying airtime.

They have more spendable income available. They are now able to send emails and have conversations over social media, rather than having to make phone calls. To date, community members are not charged for making use of the computer services at the schools. As a result, a portion of their costs are reduced. Some people have been able to apply for their remittances online, for example, the case of the "pig culling scheme" discussed earlier. This has shown that through the programme, community members have had the opportunity to improve the way in which they receive income.

B) Shortcomings

One of the project goals from the baseline study was to assist arts and craft members to sell their products online. This has not been actively explored in the project. The SLL has set up a platform for arts and crafts sellers to market their goods; however, it is up to the individual community members to actively make use of this service, and to actively set up their own websites. Unfortunately, many community members cannot afford to set up their own online presence. Despite having the opportunity to sell products online, and being given the online platform, most business minded people in the community are not able to exercise that choice. There are external factors in their context (opportunity structure), such as lack of funds to maintain a website, or the knowledge to utilise the Internet to market their goods.

4.3.4.5 Cultural identity and political awareness

A) Opportunities

Outcomes: Political awareness

43.7% of the total respondents, view that they have become more aware of the political state of the country, see Figure 18. Although, not much is captured in terms of local political news, community members have been able to access news (mainly through online newspapers) occurring in the country on a national level. 41.4% of the respondents do not make use of the SLL facilities to access information on the political stance of the country. Moreover, they do not show an interest in accessing information to effectively engage in political debates. While 43.7% of community members perceive that they have become more aware of political news, only 37% feel they are able to participate and engage in political debates. 18.4% go as far as indicating that having computer literacy skills does not enable them to engage in political debates on a local or national level.

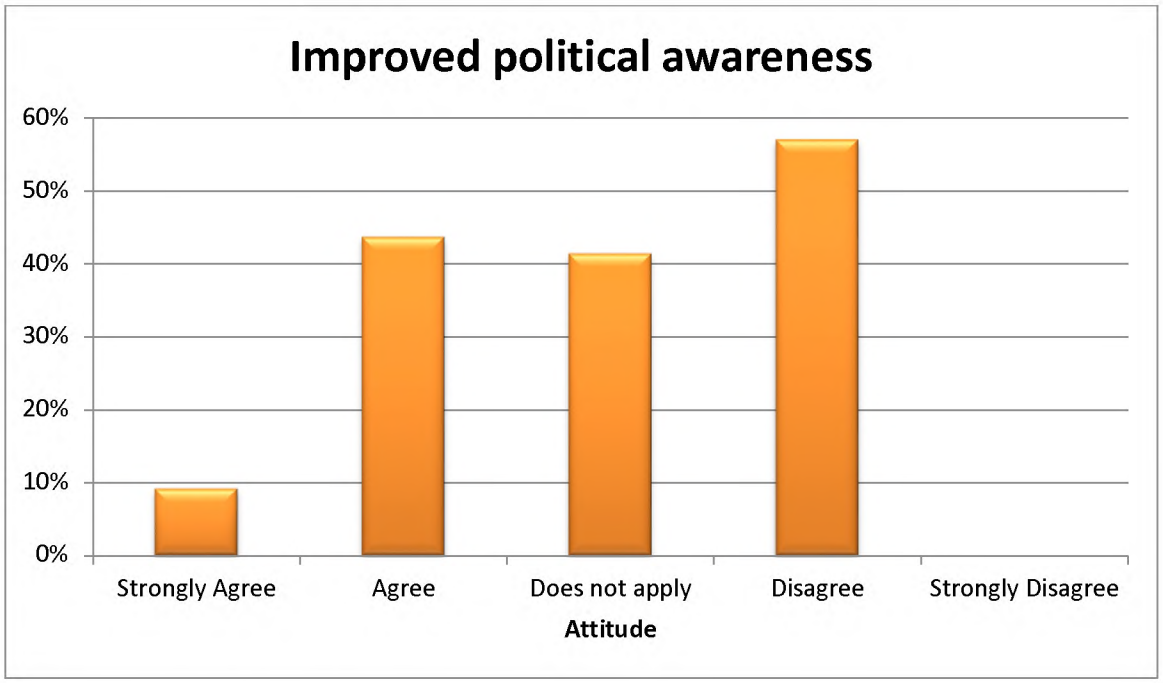


Figure 18: Improved political awareness.

Outcomes: Cultural identity

It was observed that the type of information accessed influences what one can do, and how one can apply their computer literacy skills. Community members often use the facilities for printing of personal documents such as CVs, or for reading news and social media purposes. Therefore, the majority of people do not see how ICTs may be used as a means to demonstrate or share ideas about their culture. As a result, 52.9% of respondents feel neutral, while 5.7% totally disagree that making use of ICTs in the project has helped them to share aspects of their culture.

The majority of respondents acknowledge that the use of computer services and attaining training through the SLL has no influence on their culture and cultural values. However, 18.4% feel that their culture is slowly being diluted as a result of having access to the Internet and computer facilities. This has been observed amongst those who make use of the computer facilities on a regular basis. Moreover, some parents have shown concern that children have access to adult content over the Internet. One respondent indicated that:

> *"In our days children do not ask for information to the elders, they go to the internet, and they do not have time for their traditional things because of this technology".*

There is minimal local cultural information being captured electronically. It was indicated by one community member that computers do assist to preserve cultural information, if it is

there. In other words, if that information is captured and already stored, it can then be preserved. 75.6% of the total respondents do not view access to knowledge or making use of technology through the SLL as a way to preserve their culture or cultural heritage. Thus far, the culture of storytelling still appears to be the only means by which their culture is being preserved; however, that is slowly not being practised.

4.3.5 Summary of Outcome and Impact – Empowerment

Table 4 below, outlines a summary of the findings for the assessment of "Empowerment". There have been cases where there have been no impacts identified yet as a result of the outcomes observed.

Table 3: Summary of findings-Empowerment

Outcome		Outcome Type	Outcome Expectation	Impact	Impact Type	Impact Expectation
Informational Capabilities	Access to information for decision making	Positive	Unexpected	Access to information to manage resources	Positive	Expected
	Enhanced communication flows in the community	Positive	Expected	Reduction in travelling time and costs between towns	Positive	Expected
	Limited informational literacy: information dissemination, content generation and information assimilation	Negative	Unexpected	Limited application of computer literacy skills	Negative	Unexpected
Human Capabilities	Confidence in computer literacy abilities	Positive	Unexpected	Apply skills to personal context	Positive	Expected
	Discouraged and low confidence in training offered	Negative	Unexpected	Limited application of computer literacy skills	Negative	Unexpected
	Access information to solve personal problems	Positive	Expected	Teachers augment their teaching with online material	Positive	Expected
	Access to illicit content by school learners	Negative	Unexpected	N/A	N/A	N/A
	Perceived improvement in education	Positive	Expected	Increased applications to attend Ngwane JSS	Positive	Unexpected

	Increased self-esteem	Positive	Unexpected	Apply computer skills to personal context	Positive	Expected
	Personal computer literacy achievement	Positive	Expected			
	Feelings of hopelessness/disappointment	Negative	Unexpected	Limited application of computer literacy skills	Negative	Unexpected
	Publicity to outside world	Positive	Unexpected	Continued increase hope in the development of the community	Positive	Unexpected
Social Capabilities	Increased community interaction	Positive	Expected	Increased community interaction	Positive	Expected
	Increased awareness of events in the community	Positive	Unexpected	Improved school interaction	Positive	Expected
	Limited community presence online	Negative	Unexpected			
	Engaging with various government departments	Positive	Expected	Gain solutions to problems related to government departments	Positive	Expected
	Ability to purchase and or market goods online	Positive	Expected	Income generation	Positive	Expected
	Minimal engagement with ecommerce platform for arts and crafts sellers	Negative	Unexpected	Minimal promotion of arts and crafts in the area	Negative	Unexpected
	Political awareness in the country	Positive	Expected	N/A	N/A	N/A
	Limited preservation of culture online	Negative	Unexpected	Dilution of culture and Minimal promotion of Xhosa culture	Negative	Unexpected

4.4 Livelihoods

4.4.1 Purpose

Livelihoods can be broadly defined as a means of making a living (Parkinson and Ramirez, 2006: 4). One's livelihood is influenced by the vulnerability context (external environment) in which one resides. Various trends, seasonality and shocks (for example, economic trends,

natural and human health shocks and seasonality of employment opportunities) have a direct impact on people's assets and the various strategies they have available to achieve livelihood objectives they desire. These livelihood objectives are what people seek to achieve and can change depending on the context, time, environment, and people (DFID, 1999; Duncombe, 2006: 83; Parkinson and Ramirez, 2006: 4).

It is important to understand how ICTs have affected one's wellbeing, the way people live their lives, protect themselves against vulnerability, and provide new opportunities for an improved future. Assessing livelihoods would look at how ICTs have aided in building people's capitals and enhanced/interacted with their livelihood strategies, to achieve desired livelihood objectives (DFID, 1999; Duncombe, 2006: 83; Parkinson and Ramirez, 2006: 4).

4.4.2 Wellbeing and facilitation of day-to-day activities

People have no direct control over the vulnerability context (trends, seasonality and shocks in the external environment). However, they are able to manage that context by resisting the negative effects or exploiting the positive ones (DFID, 1999, Gigler, 2004). Through the SLL, community members have been able to enhance their building blocks/assets such as their informational and human capital. Through the knowledge of ICTs and the ability to access information online, teachers and learners have been able to effect change in their teaching and their education respectively. In this case, the 'human capital" asset is being enhanced, which can then bring about improved standards of teaching and learning in the schools. As mentioned during interviews, teachers have an opportunity to complete their teaching duties more effectively. This in itself affects the way in which they conduct their daily work lives. However, technology can be a hindrance in the classroom. It can negatively affect a teacher's ability to achieve their objectives and fulfil their teaching requirements on time.

4.4.2.1 Facilitation of day-to-day activities in the classroom

A) Opportunities

Student learning

Through the SLL, community members, teachers and learners have had the opportunity to effect change in their way of living. Access to information via the Internet has facilitated the day-to-day tasks of some project recipients. Student learning and knowledge acquisition has been enhanced as a result of accessing information online. Although a quantitative analysis of the learners' grades over the years has not been assessed, teachers at Ngwane have indicated

that there has been some improvement in learners (those who make use of the Internet) way of learning at the school. Learners have been able to complete research assignments given their resource constraint environment in Dwesa. For example, for subjects such as geography and mathematics there has been a perceived improvement in the assessment of grades as was mentioned by one teacher at Ngwane JSS. Learners have now been able to have visual representations of the different geographical content, such as volcanic activities, being taught. As a result they gain a richer learning experience. The computer literacy training offered to learners does not form part of the formal school curriculum at Ngwane. Therefore, only learners who have been actively attending training have enhanced their learning through the SLL. Furthermore, as the training is kept broad, the onus is on the learners themselves to apply the skills they have learned to their studies.

Through the SLL, learners are exposed to computer literacy basics which will assist them at university level. Often when learners from more disadvantaged backgrounds attend university, they find it rather difficult to adjust to the new environment, especially if they have not been previously exposed to technology. Upon completion of high school most learners desire to go to university. With the ability to access application forms and the ability to apply online, learners have more opportunities to further their studies, in the hope of making a better living in the future. Attending university is one of the strategies that the community is employing to achieve the livelihood objectives that they desire (DFID, 1999; Duncombe, 2006; Parkinson and Ramirez, 2006).

Teaching

Teachers from Ngwane and Nqabara who have been actively involved in the project have been able to bring about change in the way they conduct their teaching and delivery of their class material. There are cases where teachers' work need to be computerised, such as, creating typed registers and typed school reports. One teacher acknowledged that computer literacy skills are beneficial in order to type out such reports. As a result of taking part in the SLL, teachers at Ngwane and Nqabara are now able to fulfil such requirements, such as submitting electronic reports to the Department of Education. At Nqabara, some teachers have noted that one of their colleagues has typed class registers, which simplified her tasks of keeping a record of the learners' attendance. This inspired other teachers, who then sought guidance on having their own class registers in electronic format as well, and not hand written.

4.4.2.2 Facilitation of community day-to-day activities

A) Opportunities

Similarly community members utilise computers to facilitate their day-to-day activities. For example, the community member who sells bags and uses emails to market her products. The completion of online transactions is one attractive aspect of the project that the more technology aware members of the community appreciate. These are usually the teachers at the schools and the young community members who are driven or enjoy exploring new avenues of technology. For instance, as one of the teachers at Nqabara mentioned:

> "*Even me I do not use letters for my accounts, I am using emails. I cannot survive without Internet*".

Community members are able to print their documents, such as funeral plans and various invitations that they distribute to the rest of the community. This facilitates the task of mass communication in the area. The distribution of print media such as invitations for events creates a sense of importance and prestige in the community. Having a proper invitation as opposed to just word of mouth information, gives the impression of importance. Furthermore, it aids with retaining information, as it is all documented on physical paper. For example, having a funeral programme has all the details of when the funeral will be and the procession of the funeral. Another example is when one of the project champions had to speak at a funeral and console the bereaved family. She had to give encouraging scriptures within this role. Having access to the Internet, assisted her with identifying scriptures on death and also reading on the various interpretations of some scriptures that she did not fully understand. She indicated that even for one who does not know the bible very well, one can conduct a mini study online on various scriptures around a particular theme and can then talk about that theme more appropriately, such as the case of encouraging family members at the funeral.

B) Shortcomings

Teachers acknowledged that they are able to prepare more adequately for their lessons with access to more subject content and materials from the Internet. However, the notion that "technology is time consuming" was a common theme that came across from the interviews. 60% of teachers interviewed have commented that it is time consuming to incorporate technology into their teaching strategies. Teachers felt that incorporating technology in their teaching methods and accessing information beyond their prescribed

teaching manuals required excess time, which they are not being paid for. Despite the benefits that technology may have, the teachers at Ngwane JSS had a view that technology requires extra effort to use. Furthermore, teachers felt that technology becomes discouraging when technical problems arise. For example, teachers prepare for a lesson and prepare activities which involve computers in the lab. However, due to either power failures or technical mishaps the teacher is faced with computers that do not work. The teacher then has to spend most of the lesson trying to remedy the situation. As a result, teaching time is lost and teachers become discouraged, as there is no guarantee that the computers will cooperate. For example, the project champion at Ngwane JSS mentioned:

> "*It is helping but you know technology delays us. You need to plan and prepare. Yes we do not have enough time and sometimes we do this lessons and preparing and you do all that but when you go to the class technology is stuck and it is not working. That is the main problem*".

The schools have limited human capital and as a result, the existing load on teachers is large. In this case, the technology acts as a hindrance to the successful completion of tasks. Moreover, the training offered does at times interfere with Grade 12 learners Computer Applications Technology (CAT) subject, especially at the high schools that teach the (CAT) subject, such as Nqabara SSS. 21% of participants from Nqabara, indicated that the project should not interfere with the Grade 12 curriculum. The community training sessions at Nqabara, used to occur in the same lab, where the Grade 12 learners conduct their (CAT) lessons. At times the CAT lessons would overlap with the community lessons. One of the teachers in fact suggested that there should be a separate lab for the Grade 12 learners and a separate lab for the community training. However, the training at Nqabara came to an end in 2013, and instead the training venue moved to Badi SSS. It was viewed that Badi was slightly more central than Nqabara. It was observed, however that, at Badi the Grade 12 computer lessons overlapped, on several occasions, with the SLL training time. Furthermore, as the training started at 1pm some teachers felt that the training disrupts their teaching. They have to leave their schools early to attend training, especially for venues that are far. Therefore, they have to seek permission to leave their schools early.

4.4.3 Wellbeing and employment opportunities

A) Opportunities

The poor are often faced with challenges, due to external factors such as shocks, trends and seasonality, which affect their assets and livelihoods (DFID, 1999: 25; Wieman, Gast, Hagen, and Van der Krogt, 2001: 12). Negative shocks, trends and seasonality such as climate change and economic downturns in the market often force people to live in adverse conditions. In such cases, unsustainable livelihoods are common (DFID, 1999: 25; Wieman, Gast, Hagen, and Van der Krogt, 2001: 12). Therefore, assessing vulnerability would look at how ICTs have enabled people to resist the negative effects of their environment and make use of the positive ones.

Through the SLL, there are examples of community members who became entrepreneurs. One community member that made use of the computer skills gained was able to find employment online and now conducts her business orders and payments online. She was able to make use of her skills and came across the Justine cosmetics website and signed up to be a Justine consultant. This has assisted her in making some money, by ordering products online and selling them to the teachers at the schools in her area and some community members. The project champion at Ngwane mentioned that some youth come for training so that they look for employment opportunities and look for "*these Justine and Avon businesses*". A motivation to attend training and to continue using the lab facilities is to gain employment. Given the high unemployment in the area, community members now have an option to increase their pool of livelihood strategies they employ to make a living. In their search for employment they are able to expand their computer literacy skills set and add it to their CVs, which is one strategy to enhance one's CV. In another example, a community member started offering computer services to the community, as she mentioned:

> "*It helped me in my own business because I did also buy my computer and teach other people in my community about what I know. Each person pays R30 a day to have access to my computer.*"

Through the SLL, some minor opportunities arise for the community members in Dwesa to earn some income. The SLL project team rents part of a local teacher's house, where research students stay during their field trips. Furthermore, the SLL project employs a helper to assist with taking care of the rooms when there are no trips taking place. These two families are then able to make extra income. Moreover, the project has various research students taking

part in the programme. These research students often require the assistance of local community members to conduct their data collection. For example, the distribution of questionnaires and collection of survey data for this particular research employed three community women, who were compensated for their work. Through the assistants of community members, they become exposed to how research is conducted and learn about the project's performance. One of the local research assistants, who is also a project champion at Nqabara, noted that she would like at some point to pursue a research related degree. Therefore, assisting with the data collection has given her an opportunity to see how research is carried out in a practical manner.

B) Shortcomings

The Dwesa community is plagued with poverty and people are desperate for employment and for quick ways to gain an income. As a result, the majority of community members who do attend the training (first level of interaction/involvement in the project), only attend to gain a certificate. Often the Dwesa community members have the impression that having computer skills will provide extra points or an edge to their skill set and increase their opportunities of getting employed. From the observations made, community members would often enquire about gaining certificates. They would also request that their ID numbers be printed on the certificates, to ensure that future employers have guarantee that the certificates do belong to them. Despite having a choice to apply the skills they have learned to bring about change in their lives, what often happens is that people do not know how to act upon that choice and utilise that skill set. They do not know how to go about applying their skills. Furthermore, many participants are not as interested in the process of gaining new skills, but rather are more interested in the tangible outcome of the training – gaining a certificate with a hope that employment will follow immediately after. Very few of the trainees actually use their skills set to seek employment or look for employment. Many believe that once the training is completed and they have gained a certificate, a job will miraculously land on their lap. However, it does require extra personal effort from the community members' side to find employment.

A teacher indicated that the project should organise employment opportunities for successful trainees who have completed the SLL training. They view that such opportunities will motivate others and provide tangible impacts for community members. It appears that the creation of employment is important for this community. A clear indication for many community members that the project is performing well is the creation of employment, as a

direct result of the project. Economic outcomes and impacts are important to the Dwesa community, that is why gaining certificates to find employment appears important for community members.

4.4.4 Summary of Outcome and Impact – Livelihoods

In order for ICTs to be utilised in such a manner that enhances one's livelihood, one does require further resources such as finances, skills, infrastructure, social resources, knowledge and motivation. These resources are important if one is too evaluate the information and knowledge gained through ICTs and apply it to a particular context (Duncombe, 2006). Community members have been provided with basic literacy skills, some are even motivated to make use of the skills gained. However, as mentioned previously a large number of community members do not have the knowledge or skill to evaluate that information, apply it to their context and take action based on the information accessed. Only a few community members and teachers have applied the information and knowledge gained from ICTs to their particular contexts. They are the ones who are usually more enthusiastic and self-motivated to seek new livelihood opportunities, and have a level of awareness on how to apply this new knowledge to their lives. Table 5 below, outlines a summary of the outcomes and impacts for the "Livelihood" theme.

Table 4: Summary of findings-Livelihoods

Outcome		Outcome Type	Outcome Expectation	Impact	Impact Type	Impact Expectation
Wellbeing and facilitation of day-to-day activities	Improved learning	Positive	Expected	Perceived improvement in education standard	Positive	Expected
	Improved teaching	Positive	Expected			
	Technology consuming teaching time	Negative	Unexpected	Minimal integration of technology in the classroom taking place	Negative	Unexpected
Wellbeing and employment opportunities	Employment opportunities arising	Positive	Expected	Employment of local research assistants	Positive	Expected
				Starting own businesses	Positive	Expected
	Desperation for employment and high expectations	Negative	Unexpected	Desire for quick fixes with minimal effort	Negative	Unexpected

4.5 Sustainability

4.5.1 Purpose

Sustainability aims to determine the means and ways in which an ICT4D initiative has contributed towards sustainable development (Balancing Act, 2013; Unwin, 2009: 365). ICTs can bring about positive effects on communities. However, there are also indirect negative effects that encourage unsustainable trends that do result (Souter, 2012: 4). An ICT4D initiative should then put measures in place to ensure that these negative effects are resolved.

Evaluators should assess the mechanisms put in place that will support and ensure that positive outputs, outcomes and impacts are sustainable and not short lived (Batchelor and Norrish, 2006: 16; Souter, 2012: 4). A challenge arises when trying to find a balance between maintaining and supporting something, in such a manner that it does not fail in the midst of a constantly changing rural environment. Furthermore, there is a challenge of putting sustainability into practice (Ali and Bailur, 2007: 3; Batchelor and Norrish, 2006: 16; Hilty and Hercheui, 2010: 229; Souter, 2012: 2). It is, therefore, suggested that there be a shift in focus from creating sustainable artefacts (the technology itself) to sustainability of a concept (outcomes and impacts of the technology). Emphasis should then not be placed on the ICT4D initiative being sustainable, but instead should focus on the sustainability of the outputs, outcomes and impacts of the project or programme it supports (Ali and Bailur, 2007; Batchelor and Norrish, 2006: 16).

Sustainability is interrelated with all themes proposed for the outcome and impact assessment framework. S*ustainability* provides insight into whether the positive effects Of *Strategic Value, Empowerment and Livelihoods* are long lived and do not result in unsustainable results. *Sustainability* determines whether the outcomes and impacts for all other themes are able to cope with the constantly changing rural environment and project context, and do not undermine other community goals and objectives.

4.5.2 Continued skills development

As noted previously, the SLL's main service offering in Dwesa has been the basic computer literacy training to community members. In the early stages of the project, one project champion at Ngwane JSS used to offer computer lessons to the youth in the community, in

the afternoons at 4pm. The project champion offered the training on a voluntary basis and on her own time. This was before the SLL had consistent visits to Dwesa to offer training. The computer literacy training that is offered currently requires student facilitators from Rhodes or Fort Hare University to conduct the training. The Centres of Excellence at both Universities offer funding for students to conduct research within the ICT4D field. These students are then expected to volunteer their time to train community members. Furthermore, there are students from both Universities who also use the SLL as case studies in their ICT4D research. As part of their data collection process, they too offer training to community members. As a result, the SLL has had continued influx of student volunteers who could facilitate the training.

There are a few local facilitators available, as community members are not willing to facilitate training without some form of income accrued to them. It does become a challenge when students are not available for trips to Dwesa. The training requires that facilitators stay in Dwesa for the duration of the week (Monday to Friday), which some students are not be able to commit to on a continuous basis. Despite having research student facilitators from Rhodes and Fort Hare University, it is mainly on a voluntary basis, and once their research is complete the students leave. As a result the project champion at Ngwane JSS suggested the following:

> *"If we can have someone to help us in the training of the community, who will stay here permanently and take care of the lab"*.

However, people often want a reward for their efforts; they want to be paid and will not work for free. The project champion further added:

> *"People like something which has a reward; they are lazy with things they are not going to be paid. It's only laziness and they know that they are not going to get anything in the end"*

For a project that relies on external funds and donations, a paid external facilitator will only increase costs, which the project cannot afford.

As part of the literacy training offered, the SLL continues to raise awareness about the project by inviting at least one representative, from each school or community in the area, to attend training. The aim is to have each representative trained and then return to their own school or

community to train others (train the trainer intuitive). In that way more community members are being trained, without relying heavily on external student volunteers. However, not all representatives return to their schools or communities to train other community members. A major reason for this is that it will be voluntary and they are not being paid for it.

4.5.3 Application of computer literacy skills

The University student volunteers are not provided with training on how to facilitate basic computer literacy courses. This becomes a problem, when the training offered is not consistent throughout the year and students have to employ their own techniques for facilitating the training. As most student volunteers have no formal background in teaching, the training that community members receive may not be adequate for the community to apply the skills taught. For example, school learners utilise the Internet to complete their research assignments without taking into account plagiarism issues. Student volunteers merely show learners how to access information, without going into detail on how to appropriately make use of that information in their own work. However, after some time, teachers have attempted to explain to their learners, how best to go about using external information as part of their learning process. Moreover, as mentioned previously, the training offered is a mere transfer of basic computer skills (representational use of ICTs), with little knowledge (integration) on how these skills can aid in achieving the community's goals.

The training is also not consistent throughout the year, due to uncontrolled circumstances, such as: power failures and machines malfunctioning, bad weather conditions, and variety of student volunteers with different teaching techniques. Community members then do not have sufficient exposure to training, and do not get sufficient time to practice what they have been taught. The training offered acts as the foundation on which community members can utilise ICTs to support the goals they would like to achieve. However, as this foundation is not well grounded, it can be a hindrance to providing sustainable ICT skills.

4.5.4 Motivation to use ICTs

Community members and teachers, who do manage to apply their ICT skills to support their various activities, stay motivated to keep utilising their skills. As a result, there is the desire to keep the programme operating. For example, some schools go ahead and purchase their own computers to teach their learners, in the hope that they gain the benefits that they have seen in other schools. However, there are some cases where the use of ICTs becomes discouraging. Community members then become less committed to engaging with the

project. The extra effort required when using technology and the time spent preparing for lessons, does discourage teachers. This is the case, especially when the school is already understaffed. Teachers indicated that integrating technology in teaching requires effort, whereas using traditional methods only requires walking into the class and using the board to deliver the content. Furthermore, traditional methods are easier when one has been teaching for a number of years and is well acquainted with the content. In addition, teachers indicated that they do not get paid for the extra time they put in. Another concern that seemed to discourage the teachers, particularly at Ngwane, has been the constant technical problems that they encounter with the computer labs.

4.5.5 ICTs and community initiative

Some interviewees suggest that everyone needs to work hard and work as a team to ensure that the project is successful. For positive impacts to become a norm within the SLL, it is important that community members take more initiative and responsibility to make use of the skills that they are taught, in order to make a difference in their lives. Some community members are aware that change occurs over a long period of time. They realise that the work that SLL has been doing over the years will take time to result into tangible and noticeable effects. For 60% of participants interviewed, they feel that no project changes are required for the SLL. It should continue as is, as major changes do take time to emerge. These participants also feel that the SLL has done more than enough for the project and that there is only so much that it can do to assist the community. The rest is up to community members to stand up and take initiative in their own lives.

4.5.6 Project costs and maintenance of equipment

Project champions indicated that they do not know what costs the project incurs to keep it running. Therefore, it is common for the schools to have high financial expectations of the project. For example, at Nqabara high school, there was mention that the software needs to be upgraded which the school cannot afford to do.

> *"We are working on old versions such as Windows 7 and they should make use of Windows 10 operating system to keep up with the CAT curriculum".*

There is an expectation that the project team should do everything for the schools involved in the project, which goes beyond the scope of the project offering. Furthermore, the project is already operating with minimal funds to keep the project running. There is only so much the SLL can do with the "breadcrumbs" that they obtain in terms of funding to run the project, as

was mentioned by a member of the project management team. A project champion indicated that the DoE makes use of the Windows operating system, hence the Ubuntu that is being offered by the SLL can be confusing when people have to switch to a Windows environment. However, the Ubuntu software that is being used is open source, which aids in cutting project costs.

It was noted that a challenge in terms of costs is the regular maintenance of equipment. Machines often run into problems and the bad weather conditions and electricity cuts tend to worsen the situation. The breakdown of computer facilities hinders the smooth operation of the facilities offered, as the schools have to wait for people to come from Rhodes University or Fort Hare University to come in to fix equipment. This discourages people, from making use of the facilities on a regular basis, or even consistently attending training. Furthermore, there is minimal capacity building in terms of maintenance of equipment. Although the project does offer some minor training on how to maintain and troubleshoot equipment, it is only at the basics level. Additionally, local people want to be paid, hence the project team manages the maintenance on its own.

The cost of employing someone permanent to assist with technical problems and security becomes a challenge for the schools where these labs are located. Crime and vandalism are increasing in the area of Ngwane and Nqabara. Such incidences put the schools (training centres) at more risk, as more people become aware that the schools have computer facilities. During the interviews, crime and unemployment were mentioned as high contributors to poverty, so it is no surprise that having new technology in the area opens new avenues for theft. Already, one school had a break in and computers stolen. Some interviewees, mainly teachers, mentioned that criminals target project equipment/property; this again shows that poverty in these areas is still an issue. There is poor security at these centres and it came up that the schools do not have a budget to pay for security systems or someone to keep watch of the equipment at the schools. Therefore, it becomes an easy target for theft to occur.

4.5.7 Limited financial resources

The lack of resources, especially financial resources, makes it difficult to maintain such a project. Limited access to funds makes it difficult to maintain the labs and have continuous training taking place. The schools have to raise their own funds for items such as paper, ink, extra electricity costs. For example, the schools try and charge community members for the

printing and photocopying facilities. However, these amounts are negligible when it comes to the project being self-sustaining. The project champion at Ngwane mentioned:

> "*… the school is trying. Because we do programmes like funeral programmes for the community but they pay a little amount. That amount helps nothing because it is a little amount*".

Project champions or namely teachers at the training centres have lost hope to get any assistance from the Department of Education. They feel that they get minimal support from the Department when it comes to the computer services that they offer. Some teachers feel that it would make a difference if the Department could assist with the cost of securing the labs and also the electricity bills, to keep the machines running. Also, the schools mentioned that despite having a computer lab and offering these facilities to community members for free, the DoE still provides them with a fixed budget, as with other schools that do not have these lab facilities. A school principal mentioned the following:

> *"Even the Department is not helping us and the money allocated to the school is just equal to the amount allocated to other schools without SLL, so we are using our funds for security and electricity…the school is trying on its own on the funds it gets from the Department of Education. The lab uses a lot of electricity, because we cannot switch off the machines when we go home."*

Given the expansion of the SLL to cover 17 schools it will prove to be a rather challenging task to maintain and upgrade the equipment from a cost perspective. One project team member indicated that, in the near future the SLL may encounter difficulties purchasing new equipment and setting up new labs given the funding limitations available. However, the project should still manage to maintain what it currently has, as the two Universities manage with the costs to repair damaged equipment. Furthermore, with the support of industry partners such as the Technology and Human Resources for Industry Programme (THRIP) of the South African Department of Trade and Industry, the SLL does have some funding that has been aiding the project to continue maintaining its operations in Dwesa until today. The SLL continues to have talks with relevant Government departments to get them on board, with the hope that the project in Dwesa will become self-sustaining. For example, the project management still continues to engage with different Government entities to utilise the different e-government services that have been set up for the Dwesa community to use, such

as the e-health platform. Furthermore, the SLL is continuing to experiment with various models, through research with students, to make the ICT infrastructure on the ground sustainable.

4.5.8 Summary of Outcome and Impact – Sustainability

Table 6 below outlines a summary of the findings for the assessment of "Sustainability".

Table 5: Summary of findings-Sustainability

Outcome		Outcome Type	Outcome Expectation	Impact	Impact Type	Impact Expectation
Continued skills development	University student volunteers	Positive	Expected	Reduced facilitator costs	Positive	Expected
	Poor application of computer literacy skills	Negative	Unexpected	Minimal achievement of community goals	Negative	Unexpected
	Continued motivation to use ICT	Positive/ Negative	Expected/ Unexpected	Apply skills to personal context/Minimal application of skills	Positive/ Negative	Expected/ Unexpected
	Community initiative limited	Negative	Unexpected	High expectation that employment opportunities will be immediate	Negative	Unexpected
Project costs	Schools charge minimal funds for printing and typing services	Positive	Unexpected	Amount charged is negligible but does contribute towards paying electricity bill	Positive	Unexpected
	External maintenance of equipment	Negative/ Positive	Expected	Local capacity not developed	Negative	Unexpected
Project funding	External partner collaborations	Positive	Expected	Some funding for continued operation	Positive	Expected
	Creation of networks with government departments	Positive	Expected	Possibility for more funding	Positive	Expected

Chapter 5: Conclusion

An outcome and impact assessment aims to describe the effects the Siyakhula Living Lab (SLL) has on the community of Dwesa. The key themes that have been assessed in the SLL include: Strategic Value, Most Significant Change, Empowerment, Livelihoods and Sustainability. The assessment of Strategic Value aids in identifying how the Dwesa community has been equipped to achieve the goals that they value. It was found that community members have been trained in basic computer literacy skills which they can use to effect change in their lives. However, for most community members a major challenge has been the lack of awareness on how to apply those new skills to the daily lives. The assessment of Most Significant Change aided in identifying what project offerings the community considered to be of most value. It was found that a significant change in the community has been the ability to use computers. Before the programme many community members had not been exposed to computers nor had they gained any computer literacy skills. As a result, taking part in the SLL has offered them the opportunity to gain these skills. Most significant change differed from other themes, as it did not assess a project through a particular lens. Given it was a collection of stories of people's experiences within the project, such experiences/stories can be categorised into any of the other themes. As a result, Most Significant Change is closely linked to and forms a part of *strategic value, empowerment,* and *livelihoods.* The assessment of Empowerment aided in identifying whether the communities informational, human and social capabilities have been enhanced. It was found that the presence of the SLL has influenced the community's ability to communicate, solve problems in the community, complete tasks, engage and interact with people in the community and have opportunities to generate an income for themselves. However, it was found that this only applied to people who were self-motivated and made the extra effort to apply the skills they have been taught to their personal lives. The assessment of Livelihoods aided in identifying whether there has been a change in people's way of living. It was found that the wellbeing of the community and their vulnerability was affected by the SLL. This has been the case mainly for the teachers at the schools who have benefited from the programme in terms of their teaching. However, there was a view that technology is time consuming and at times can be discouraging to use for teaching purposes. The assessment of Sustainability aided in identifying the ways in which the SLL keeps its services running in the Dwesa community. It also aids in identifying the measures put in place to ensure negative outcomes and impacts are rectified. It was found that although the community is being equipped with

basic computer literacy skills, the training offered is limited. As a result in order for the training to truly equip the community in achieving their goals the type of training offered should equip people with knowledge and skills on how to apply ICTs in their daily lives. Furthermore, given the limited funds available the SLL may face challenges in maintaining the school labs and upgrading any of their equipment which may hinder the project services. The results from the report provided a general overview of the outcomes and impacts of the SLL in the Dwesa community. These results allow for the emergence of further in-depth investigations. For example, further study into offering contextualised computer literacy training could provide in-depth understanding into how the SLL can be improved and why the current training offered is limiting.

Chapter 6: References

Ali, M., and Bailur, S., 2007. The Challenge of Sustainability in ICT4D – Is Bricolage the answer? *Proceedings of the 9th International Conference on Social Implications of Computers in Developing Countries*. May 2007, Sao Paulo, Brazil. [Online] Available at: <http://www.ifipwg94.org.br/fullpapers/R0010-2.pdf.> [Accessed 26 March 2012]

Alsop, R., Bertelsen, M.F. and Holland, J., 2006. *Empowerment in Practice: From analysis to implementation*. [Online] The World Bank. Directions in Development. Available at: <http://siteresources.worldbank.org/INTEMPOWERMENT/Resources/Empowerment_in_Practice.pdf.> [Accessed 24 September 2013].

Balancing Act. 2013. Rescue attempt on poorly performing telecentres in South Africa. *Telecoms, Internet and Broadcast in Africa-Balancing Act,* 340. [Online] Available at: <http://www.balancingact-africa.com/news/en/issue-no-340/telecoms/rescue-attempt-on-po/en.> [Accessed 24 November 2014].

Batchelor, S. and Norrish, P., 2006. Framework for assessment of ICT pilot projects: Beyond Monitoring and Evaluation to Applied Research. *Information and Development Program.* [Online]. Available: <http://www.infodev.org/en/Publication.4.html> [Accessed 04 April 2012].

Department for International Development (DFID). 1999. *Sustainable Livelihood Guidance Sheet Section 2, DFID, London* [Online]. Available at: <http://www.livelihoods.org/info/guidance_sheets_pdfs/section2.pdf >[Accessed 19 March 2012].

Dugmore, H., 2012. The Siyakhula Living Lab –We are growing. *The Siyakhula Living Lab: An important step forward for South Africa & Africa.* Communications & Marketing Division, Rhodes University. November 2012.

Duncombe, R., 2006. Using the livelihoods framework to analyse ICT applications for poverty reduction through microenterprise. *Information Technologies and International Development*, 3, 3, 81-100.

Gigler, B.S., 2004. Including the excluded: can ICTs empower poor communities? Towards an alternative evaluation framework based on the capability approach. *4th International Conference on the Capability Approach.* University of Pavia, Italy, September 5-7, University of Pavia.

Gomez, R. and Pather, S., 2012. ICT Evaluation: Are we asking the right questions? *The Electronic Journal on Information Systems in Developing Countries.* 50, 5:1-14.

Grunfeld, H. 2007. Framework for evaluating contributions of ICT to capabilities, empowerment and sustainability in disadvantaged communities. Paper presented at the *CPRSouth2 (Communication Policy Research) Conference, 'Empowering rural communities through ICT policy and research'*, Indian Institute of Technology (IIT) – Madras, Chennai.

Hamel, J. 2010. *ICT4D and the human development and capabilities approach: the potentials of information and communication technology.* Published in: Human Development Research Paper Series (HDRP), Vol. 37 (2010), 1-77. [Online] Available at: <http://mpra.ub.uni-muenchen.de/25561/.> [Accessed 26 March 2012].

Hilty, M. and Hercheui, D.M., 2010. *ICT and Sustainable Development* (Report 328). Queensland, Australia: IFIP International Federation for Information Processing.

Hodgkinson-Williams, C., 2006. *Revisiting the concept of ICTs as "tools": Exploring the epistemological and ontological underpinnings of a conceptual framework.* [pdf]. Available at: http://itforum.coe.uga.edu/paper88/Hodgkinson-Williams-2006rev.pdf.> [Accessed August 2015].

Osah, J., 2012. *Siyakhula Living Lab Process Assessment Report.* [Leaflet]. Rhodes University.

Pade, C., 2009. *Siyakhula Living Lab Needs Assessment Report.* [Leaflet]. Rhodes University.

Pade-Khene, C., Palmer, R. and Kavhai, M., 2010. A baseline study of a Dwesa rural community for the Siyakhula Information and Communication Technology for Development project: understanding the reality on the ground. *Information Development,* 26(4), pp. 265-288.

Parkinson, S. and Ramirez, R., 2006. Using a sustainable livelihoods approach to assessing the impact of ICTs in development. *Community Informatics*, 2, 3, 116-127. Available at: <http://ci-journal.net/index.php/ciej/issue/view/15.> [Accessed 26 March 2012].

Rossie, P.H., Lipsey, M.W. and Freeman, H.E., 2004. *Evaluation: A systematic Approach.* (7ed). London: Sage Publications.

Sen, A., 2013. The Ends and Means of Sustainability. *Journal of Human Development and Capabilities: A Multi-Disciplinary Journal for People-Centered Development*, [online] Available at: <DOI: 10.1080/19452829.2012.747492> [Accessed 04 February 2014].

Siyakhula Living Lab, 2012. Siyakhula Living Lab [online] Available at: <http://siyakhulall.org/> [Accessed 06 November 2013].

Siyakhula Living Lab., 2014. The Siyakhula Living Lab & Reed House Systems. [online] Siyakhula Living Lab. Available at: <http://www.siyakhulall.org/sites/default/files/SiyakhulaLivingLab_ReedHouseSystems.pdf> [Accessed 28 September 2015].

Souter, D., 2012. *ICTS, the Internet and Sustainability*: (A discussion paper, 28 May 2012). Manitoba, Canada: International Institute for Sustainable Development.

The Local Economic Development publication for South Africa (LEDSa), 2011. Growing and weaving with ICT: The Siyakhula Living Lab and Reed House Systems. *The Local Economic Development publication for South Africa,* August-September. p18.

Unwin, T., 2009. *ICT4D-Information and Communication Technology for Development.* Cambridge: Cambridge University Press.

Wieman, A., Gast, L., Hagen, I. and Van Der Krogt, S., 2001. *Monitoring and Evaluation at IICD: An Instrument to Assess Development Impact and Effectiveness.* Report no. 5, The Hague: International Institute for Communication and Development (IICD), April.

World Bank Group, 2012. *ICT for Greater Development Impact-Information and Communication Technology.* [Online] World Bank Group Strategy. Available at: <http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONAN

DTECHNOLOGIES/Resources/WBG_ICT_Strategy-2012.pdf.> [Accessed 11 September 2013].

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Outcome and Impact Assessment Report

Information and Communication Technology for Rural Education Development [ICT4RED]

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Chapter 1: Introduction

The outcome and impact assessment of rural Information and Communication Technologies for Development (ICT4D) programmes is necessary to determine the role that ICTs play in such programmes. An outcome and impact assessment aims to describe the ICT project effects – intended, untended, positive and negative. To ensure that a more holistic outcome and impact assessment is conducted, the assessment process should take into account the different evaluation domains that make up an ICT4D evaluation lifecycle. Such a process forms part of a comprehensive approach to evaluation. The outcomes and impacts of any ICT4D initiative should be understood in terms of five interrelated themes, as part of a comprehensive approach to evaluation. These key themes include: Strategic Value, Empowerment, Livelihoods and Sustainability. These themes are assessed based on criteria from previous evaluation reports, observations, and outcome and impact theory.

The Information and Communication Technologies for Rural Education Development (ICT4RED) in Cofimvaba, which has been operating since 2012, is an e-textbook initiative implemented by the Council for Scientific and Industrial Research (CSIR) Meraka Institute. The ICT4RED project aims to influence positive change in the teaching and learning environment in Cofimvaba and the development of 21st century skills among teachers and learners (Herselman and Botha, 2014). The project aimed to hand over the full management of the project to the Department of Education in 2015 and continue to expand the project to all school circuits in the District. As a result of the expansion and the handover process, an outcome and impact assessment is deemed appropriate. Arthur Mfebe Senior Secondary School (SSS) is the pilot school for the project. It was the first school where teachers were trained and tablets were awarded. Given that the project has been in operation the longest at Arthur Mfebe SSS, it is expected that some form of outcomes will be experienced at the school. Therefore, the Outcome and Impact assessment was centred on the effects of the project on Arthur Mfebe SSS. The lessons learned from the assessment, will aid in improving the ICT4RED project, and guide the continued expansion of the project.

The following report outlines the results of the *Outcome* and *Impact Assessment* of the ICT4RED project, in Cofimvaba South Africa. From the overall assessment, it was found that there were no Impacts present. The project has only been in operation for two and a half years

at the time of the assessment. Therefore, it is no surprise that there were no impacts identified. Consequently, all the results presented within this report are Outcome related. The report is outlined as follows: a brief background of the needs of the target community in Cofimvaba is described. The methods used to assess the project are then discussed. Subsequently, the report discusses each outcome and impact theme, and presents the findings.

Chapter 2: Needs of the Target Population

The Information and Communication Technologies for Rural Education Development (ICT4RED) project aims to support teaching and learning through the use of ICT in the Cofimvaba school district. The project is situated in Cofimvaba, Eastern Cape South Africa and has been in operation since August 2012. The Council for Scientific Research (CSIR) has overall project management responsibilities, which are designed to be handed over to the Department of Education (DBE) in the Cofimvaba District in 2015. The project provides tablets to teachers, and District Officials learners at 26 Nciba circuit schools in the Cofimvaba school district. The project further provides training on various teaching strategies to teachers and District Officials. The key needs being met by the project include:

- The development of 21st century skills of teachers and learners
- The improvement of learner results
- The improved employability of youth

Chapter 3: The Outcome and Impact Assessment Methodology

The Evaluation Questions

Four assessment themes have been identified as key to evaluating the outcomes and the impacts of the ICT4RED project. These themes include Strategic Value, Empowerment, Livelihoods and Sustainability. Most Significant Change has been identified as an essential method for data collection across all key themes. The research questions that guided the Outcome and Impact Assessment are as follows:

1. Strategic Value
   1.1 What strategic value is the ICT4RED project adding within the Cofimvaba district and specifically to Arthur Mfebe Senior Secondary School (SSS)?

1.2 Are project outputs equipping project recipients to achieve improved teaching and learning?

2. Most Significant Change
   2.1 What has been the most significant change that has occurred at Arthur Mfebe SSS and the community?
   2.2 What would project recipients like to see differently as a result of the ICT4RED project?
3. Empowerment
   3.1 Have teachers and learner's informational, human, and social capabilities been expanded?
   3.2 Have the teachers and learner's assets (psychological, informational, organisational, material, financial) been enhanced as a result of the ICT4RED project?
   3.3 Has the teachers and learner's pool of choices been expanded as a result of the ICT4RED project?
   3.4 Have the teachers and learners utilised the choices available as a result of the ICT4RED project and have desired results been achieved?
4. Livelihoods
   4.1 What livelihood objectives were anticipated to be met as a result of the project? And have they been met and how?
   4.2 Has the project aided in enhancing the project recipients' capitals?
   4.3 Has the project affected the project recipients' livelihood strategies (ways of making a living)?
5. Sustainability
   5.1 What measures have been put in place to ensure the positive outcomes and impacts are sustainable?
   5.2 What measures have been put in place to mitigate the negative outcomes and impacts that have been observed?

The Methods and Procedures

For purposes of the assessment, four main methods were used to elicit data:

- **Interviews**

  Interviews were held with six teachers, two district officials, one subject advisor, one technical assistant and two ICT champions. These participants could detail the

significant changes they had observed since the inception of the ICT4RED project. Interviews also aided in eliciting information on whether teachers and learners' capabilities were enhanced, and how ICTs affected their way of teaching and learning.

Interviews with the ICT champions and teachers provided in-depth detail as to how the ICT4RED project was equipping Arthur Mfebe SSS to achieve improved teaching and learning.

Interviews with the district officials, subject advisors and teachers aided with identifying the measures put in place to ensure sustainability of the project's outcomes and impacts.

- **Narratives**

  Written storytelling narratives from the high school children who have been participating in the ICT4RED project provided rich detail on the changes brought about by the ICT4RED project.

  The learners were requested to provide their views on the most significant change that they have observed at Arthur Mfebe SSS and in the community. They also provided recommendations on the changes they would like to see in the ICT4RED project.

- **Participant Observations**

  The TPD training offered an opportunity for the researcher to engage with several of the District Officials and Subject Advisor. During training the researcher also completed the training tasks and took part in the various group assignments that were conducted. The researcher, however, had limited time to take part in the Teacher Professional Development (TPD) training of district officials in Queenstown. Moreover, the researcher had the opportunity to observe some of the lessons, particularly the Mathematics and Agriculture lessons, at Arthur Mfebe SSS. Although the observations were conducted over a short period of time, the researcher gained some useful insight on how teaching strategies were influenced by the ICT4RD project.

  The researcher took field notes on how the ICT4RED project operated on the ground and the views and opinions of teachers and district officials as they took part in their

training. The researcher also had the opportunity to observe the Grade 12 Maths class and the Agriculture Management Practice lessons at Arthur Mfebe SSS.

- **Documentation**

  Documentation of the ICT4RED project initiation, and implementation aided in providing background details of the various outputs the project produces to position Arthur Mfebe SSS to achieve enhanced teaching and learning.

Analysis of Data

The data collected was analysed through qualitative means. The data from the interviews, previous records, participant observations and narratives were analysed through a process of thematic analysis using the Atlas.Ti tool. The data was, subsequently categorised according to the outcome and impact themes identified.

The Evaluation Participants and Stakeholder Relationship

The evaluation follows a collaborative evaluation, which includes various project stakeholders. Involving stakeholders continuously and actively, aids with drafting evaluation questions, while sharing their concerns and ideas they may have.

Teachers, Subject Advisors, ICT Champions and District Officials, who received TPD training, offered by the ICT4RED project, form part of the key participants in the evaluation, as they provide information on the outcomes and impacts the project has had within their community. Target participants aid in providing feedback on how the project is functioning and the long-term effects on the Arthur Mfebe SSS and other schools in the area. The evaluator took into account that certain groups could provide more details for particular themes. The following was noted:

- The ICT champions, who are closely associated with the day to day operations of the project, played a key role in the outcome and impact assessment process. They had access to the relevant project participants who would provide meaningful data for the evaluation. Furthermore, they were more familiar with the project context and the environment in which the project operates. They therefore, could assist with the data collection process by providing advice on relevant instruments to utilise for the assessment.

- One project team member provided the researcher with documentation on the project initiation and implementation process. They also played the role of liaison between the school and various research participants and the researcher. Project team members, ICT champions and District Officials were most useful for the assessment of the *Strategic Value* and *Sustainability themes*. *Strategic Value* and *Sustainability* involved data related to the management and leadership of the project and required strong input from these groups as they were involved in the steering of the project.
- For *Empowerment* and *Livelihoods*, these themes target end users and the wider community as these themes have a primary focus on the longer term effects (impacts) the project has had on the school.

Chapter 4: Outcome and Impact Assessment Findings

4.1 Strategic Value

4.1.1 Purpose

Strategic Value aims to identify the value an ICT4D initiative adds to a community or development goal. It identifies how an ICT4D initiative equips the target community to achieve the goals they desire to achieve and facilitate further development agendas. It is important for ICT4D initiatives to outline the role that ICTs play and how the initiative aligns itself within the broader goals of the target community and human development (Hamel, 2010). The assessment of Strategic Value requires the assessment of the *positioning* of a community in favour of achieving desirable outcomes and impacts. For such an assessment, it is important to ask how the ICT4RED project has equipped Arthur Mfebe to support their teaching and learning, and improve the 21st century skills of teachers and learners. This can be achieved through identifying the different ICT4RED project activities that take place to assist and support Arthur Mfebe SSS. Strategic Value also entails expanding a supported development programme into new avenues and assessing its future prospects.

4.1.2 Knowledge and Awareness

A) Opportunities

Project Presence

The ICT4RED initiative is well known in the community. The community is aware of the project's activities at the school and they are aware of the aims and goals of the project. The teachers at the school are well aware of the end goals of the project. They are also informed on the various stakeholders involved in the initiative and the various roles they play. Such level of awareness instils confidence in the teachers and the community that the project is indeed theirs and they too have a part to fulfil. Moreover, such level of awareness has sparked further interest in the community to also be a part of the initiative and also learn more about ICTs.

Ownership of the project

From the onset, Arthur Mfebe SSS and the Department of Education (DoE) were aware that the project will be handed over to the DoE in 2015. All schools who were part of the ICT4RED initiative including Arthur Mfebe SSS were encouraged to prepare ICT polices and plans on how they would manage the project and plan the way forward. Through the support of the CSIR team, teachers, principals, and the DoE are guided on formulating these various strategies for the future plans of the project. A recurring sentiment was the acknowledgement and understanding that they (the schools and the DoE) owned the project and had to be prepared to take over the complete management of the project from 2015 (once the CSIR team steps down). Moreover, during each tablet award ceremony at the schools all parents and learners were invited to attend and witness the event. Parents and learners were encouraged to keep their teachers accountable to use the tablets in their teaching practices. Inviting parents and learners to such events aided in creating a sense of involvement of the whole community in the project and continue to inspire the community to own the entire initiative. For example, one district official indicated:

> *"They are involved. They own this project because they know what is happening to their kids."*

In the inception phase of the project the school also held a meeting with the parents to inform them about the project and, therefore, raise awareness in the community on the various project activities, including its aims.

ICTs and emerging possibilities

Teachers at the school were becoming aware of alternative uses for ICTs beyond accessing electronic textbooks. They were being exposed to various technologies and ways in which to enhance their way of performing tasks. For example, the English teacher realised that through ICT4RED project, he has learned how to better navigate his mobile phone. In the past, he only used his mobile phone for WhatsApp® Messenger and phone calls. Through using the tablets and learning about various applications and functions, he began to apply similar skills on his mobile phone and explored the various applications on his phone. Another teacher noted,

> *"It's a dream come true because we never even touched a computer… we never touched a laptop…we only use our phones and we didn't even know that our phones as well could work as computers then".*

As teachers become aware of the different possibilities, they appreciate the technology more. Two teachers came to the realisation that it would be easier to purchase online books rather than photocopying images and uploading them onto the server. That way, the school will not constantly have to buy physical textbooks. Another example observed was that teachers are realising that there are alternative ways to store information, such as on the cloud. For example, the Agriculture Management Practice teacher was influenced by the ICT4RED project and began using Dropbox to save her work.

B) Shortcomings

Perceptions of discrimination

The introduction of the ICT4RED project created an impression that Arthur Mfebe SSS was now an advanced school (Model C School) as compared to other schools in the area. Arthur Mfebe SSS was receiving much attention, which created feelings of neglect experienced by other schools and other learners. For example, the Grade 12 learners went for a camp and learners from other schools questioned the Arthur Mfebe SSS learners as to why they are attending the camp. The aim of the camp was to provide extra assistance to learners in the district and prepare for the final year examinations. Learners from other schools noted that the Arthur Mfebe SSS learners had tablets and indicated that the Arthur Mfebe SSS learners have all the resources they need on the tablets so there is no need for them to attend the camp. Even with teachers, there are feelings of discrimination. For example, one teacher attended a workshop whereby teachers from different schools came together. As this particular teacher

drew out her tablet to conduct her work, the teachers from other schools felt offended that her school (Arthur Mfebe SSS) was the school selected to be the pilot school for the project.

4.1.3 Skills Development

A) Opportunities

Teacher Professional Development training

A key component of the ICT4RED initiative is the Teacher Professional Development (TPD) training that teachers go through, prior to being awarded with tablets. Teachers are equipped with various teaching strategies that aim to enhance 21st century learning and innovation skills (communication, collaboration, creativity, and critical thinking skills). Examples of strategies are: "flipped classroom", whereby learners are given study material to go through at home and consequently conduct various group activities during class based on what they studied at home, "story telling", "mind mapping", "game based learning", and so forth. These strategies aim to aid the teacher in transforming their way of teaching in order to improve education at the school.

Teachers were given tasks to complete as part of the training and are awarded badges for each task successfully completed, including demonstrating practical evidence of the application of the teaching strategy in their class. The overall process of introducing teachers to different teaching strategies, giving them the opportunity to apply these strategies to their own context, and assessing their progress, prepares the teachers to enhance their teaching at the school. Moreover, through the process of learning new teaching strategies, the teachers were equipped with basic tablet literacy skills. They learned about different apps and different ways to utilise tablets as a tool for teaching and learning in the classroom. These skills were preparing the teachers to transform their traditional (chalk and board) methods of teaching in the classroom. The teachers also learned about the Internet and the safe use of the Internet, such as issues of privacy and copyright laws. For example, one teacher noted:

> *"Before I was not aware. So now I am aware what to put on the Internet and be careful".*

The training provided through the ICT4RED programme went beyond knowledge on how to use a tablet. It emphasised different teaching strategies and how to incorporate the use of tablets through that process. The training offered was quite structured and allowed for reflection and feedback, which reflects what is outlined in the ICT4RED project TPD Theory

of Action – to provide "TPD as a structured and scaffolded process" in order to mitigate second order barriers to the integration of technology in the classroom (Herselman and Botha, 7:2015). Therefore, there is evidence of aligning the main project outputs (TPD) with the end goal of enhancing teaching and learning at Arthur Mfebe SSS. Teachers indicated that the training was enjoyable and the training team brought about an enthusiastic atmosphere to engage the teachers in the training, which increased their confidence and motivated them to learn the various teaching strategies. The excitement was also partly attributed to the fact that at the time the ICT4RED programme was implemented, there was no Internet or technology at the school. Through the introduction of technology the teachers' curiosity arose and showed a keen interest to learn. One teacher indicated, *"The more we became involved the more we are interested"*. Arthur Mfebe SSS has nominated two teachers who act as training facilitators and ICT champions at the school and the surrounding schools where the project was implemented in consecutive phases. These two teachers also support the teachers in their area with any challenges they are experiencing with utilising tablets in their teaching. The availability of the two facilitators/ICT champions at the school and in the area ensures teachers have an opportunity to access continued support for their professional development and their use of tablets.

From the observations made, the teachers appreciated and engaged more with the training when the facilitators spoke in isiXhosa. They were able to express themselves fully and converse with the facilitators, highlighting any concerns or clarifying any points of confusion. Moreover, it was observed that teachers could relate more to facilitators who were their colleagues (teachers who went through the training during previous phases). This formed part of the train-the-trainer aspect of the project. Facilitators who were from the community could provide practical examples on how they incorporated the strategies in their own subjects. Therefore, teachers were able to relate and therefore, engage more in the training as compared to when they had external facilitators.

Local technical capacity building

As part of the future plans of the project and the hand-over process of the project to the Department of Education, there will be local youth who will be trained on the technical aspects of the project, such as the repair of damaged tablets. These youth will be deployed to all the schools that form part of the ICT4RED initiative. The aim is to have at least one person to support teachers and learners with any technical challenges they may be facing. By ensuring that such a support structure is in place aids in mitigating technical challenges that

may hinder the teaching and learning process. These youth are being equipped with the technical knowledge needed to effectively support the schools. The youth will be trained by the current existing technical support staff member at Arthur Mfebe SSS.

B) Shortcomings

Teacher Professional Development training limited

Teachers have raised concerns that the training time provided is not sufficient for them to fully grasp the essence of the different modules taught. They feel that once the training is complete and they return to their schools they have forgotten what they learned or they are not clear on what is expected in terms of the assessments that follow the training. However, the training itself cannot be lengthened *"because the district director said that this should not interrupt with teaching and learning"*, as noted by one district official. Therefore, to ensure that the normal school calendar is not affected and that teachers are not kept from schools too long, the teacher development course is compressed, which means teachers learn a number of work tasks in a short period of time. Moreover, the training has to be limited to after-hours, in order to avoid disrupting the school calendar. This does become a problem at times as some teachers stay far from the training centre and often would not be keen to remain for training beyond the three-hour training slot allocated. Several teachers suggested that they would appreciate follow-up training to be made available or extra support beyond the training itself. However, teachers who feel that they need support have the opportunity to approach their district officials or the facilitators/ICT champions at the school. Teachers feel that the district officials are unable to assist them sufficiently with the 21st century skills and the integration of tablets. One teacher commented:

> *"They were here. Discouraging, because they themselves don't know. They just came here and took tablets and left. They are nowhere right now".*

When district officials are also not well grounded in the various teaching strategies and grounded in the integration of technology in the classroom, they too continue to have challenges supporting their teachers within the district. It would appear that teachers prefer to have more formal training along with the support from the district officials and ICT project champions. It was observed that teachers also required an external push and motivation to implement and engage with the strategies they were exposed to during the training. Their interest in having more training and cementing what they have learned is a further indication of their interest in the use of technology in their teaching.

The need for additional and continuous training has highlighted the need to monitor the progress of the teachers in integrating tablets in their teaching strategies, beyond the training offered. Monitoring and accountability were terms that surfaced several times during the interviews with teachers. There was a strong need to ensure that there was regular monitoring and accountability occurring at the school to ensure that integration was indeed taking place. One teacher mentioned,

> *"It will be just a once off thing and then when years are progressing forward and it will be down again. So that's why I am saying the most important factor is to monitor, it must be monitored because schools are different. This school will be having maybe many youngsters and youngsters they are eager to learn ICT but in other schools you find old ladies and grannies…and papas you see, so it will be a lost cause."*

The ICT champion mentioned,

> *"Really* there *is need for monitoring, and those teachers there still need to be supported because some of them were helped by their colleagues in order to complete the task."*

Without proper and consistent monitoring taking place, the school is not held to account for the technology and training received by the teachers. The ICT champion further commented,

> *"I think* this *project needs a strong a follow-up because now you find out that the school that was piloted first when you come to that school the learners are still seated in the same old way".*

Through continued monitoring, teachers can be held accountable for their progress to ensure that the goal of enhanced teaching does indeed occur. There is a desire to make a difference in the school through technology and hence the interest to have a formal monitoring system in place. As the CSIR team steps down to hand over the project to the Department of Education (DoE), one teacher further felt the need to monitor teachers progress in order to assist those teachers that are having difficulties integrating technology in the classroom. That way, even if the CSIR team is not there, the school is still being monitored, which encourages teachers to improve their use of technology for teaching. However, it was noted that there is tacit pressure from other schools that were not part of the ICT4RED initiative to see Arthur Mfebe SSS perform well. There have been comments that because the school has been gaining attention through the project and they have technology at the school it is expected

that the school should be performing well, as compared to other schools. Therefore, some teachers do feel pressured to meet the expectations of the general community. As part of the monitoring process at the school, one teacher suggested that they should have proper guidelines in place reflecting on where they are now as a school and where they would like to be and guiding steps on how to get there to ensure that full integration of technology and subsequently enhanced teaching and learning does take place.

Putting teaching strategies into practice

Beyond the training that was offered, the teachers did not always utilise or implement the new strategies they had learned. From the various school visits conducted, particularly Arthur Mfebe SSS, teachers were merely teaching using the traditional methods they were used to. Upon further investigation, some teachers indicated that they did not know how to apply the skills taught to suit their own subjects. One reason for this was that during the training they had the assistance and guidance of the facilitators and it appeared that they understood and were able to complete all tasks. However, in the absence of the facilitators, teachers had difficulties. After each training module, teachers were then allocated tasks to implement each teaching strategy and demonstrate evidence on how they applied it in their context. However, once they had completed all modules teachers easily fell into the trap of not consistently applying the skills learned and felt overwhelmed with the task of applying the new teaching strategies in their classroom. One teacher mentioned:

> *"Yes we were taught in the workshop, but how are you going to do this in class".*

When they return to their schools, they struggle to apply those skills on a regular basis. Some teachers felt that they left the training without grasping everything that was taught and easily forgot the content, especially the more mature teachers who are not used to working with technology in general. At this point, the support of district officials and ICT champions becomes important. However, even this support is limited, as mentioned previously. The project champion at the school says,

> *"The training is good, the strategies are very much good, and they can yield good results if people were to put that into practice"*

It was also noted that because the training was quite broad and not tailored to a particular subject, teachers felt they needed that extra guidance on how to contextualise it to their own context (subject they teach). One teacher mentioned,

"With the general approach you need to be very creative to make it suit a certain subject, but if you are trained maybe tablets in Mathematics it will be very much easy to teach".

The teaching strategies taught were presented at a general level that incorporated any field of study. That way, any teacher from any discipline can use these strategies to suit their subjects. The teachers found it difficult to translate the strategies taught from the general to their specific subject. As a result, it was easy for them to resort to their traditional way of teaching. They treat the technology as a complete separate entity from the teaching strategies rather than seeing technology as a tool to facilitate their teaching. Furthermore, one teacher indicated that the circuit does not have a subject advisor specific to ICTs to assist with contextualising the various ICT4RED project teaching strategies using technology. He therefore, felt that the support the teachers gain, after the TPD modules are complete, is lacking, which affects their ability to put their skills into practice. Moreover, one teacher noted that some of the strategies taught are not well suited for a rural South African context. She mentioned:

"this is too much western this style, because if you judge our culture our parents know that for my child to study needs a teacher at school parents can never thought that learning can be done home".

In this case, this particular teacher was referring to the 'Flipped Classroom' strategy not being suitable for primary school learners. It highlights how teachers are not aware on how to contextualise and adapt strategies to suit their contexts. It also highlights that teachers are not blindly implementing what they have learned but are engaging with the content taught and identifying areas that may require change.

During the training, teachers were given the opportunity to reflect on the strategies and give regular feedback where they indicate how certain strategies might not be suitable for their context. A subject advisor realised that:

"There is still a need for a training ... You will find that sometimes people do not learn on the same level or they cannot learn on the same pace".

The three-hour training the teachers went through for each module was overwhelming and as the subject advisor mentioned, not everyone learns at the same pace, especially the older teachers. One teacher strongly suggested that they should have a support staff member who is

dedicated to assisting the teachers at the school with using tablets and also with the integration of those tablets in their teaching. One subject advisor and the technical staff member at Arthur Mfebe SSS further suggested that it would be best to cluster the teachers into groups according to subjects and grades and then conduct regular training (on a quarterly basis) to support the teachers. This training will then be focused on that particular subject and will provide the teacher with a better foundation on how to contextualise the various teaching strategies to their class. The subject advisor noted that the plan to cluster teachers was a topic they were discussing with other subject advisors and district officials.

Formal training limited to teachers

The training offered as part of enhancing teaching and learning at Arthur Mfebe SSS was directed to teachers and subject advisors alone, given that it was a teacher Professional Development course. The learners did not gain any formal tablet literacy training in order to utilise tablets as part of their learning process. The initial aim was that as the teacher utilises technology in their teaching the learners would catch on and acquire the necessary skills, while the class content is being taught. This, however, became a problem when learners were not familiar with technology and have no prior experience with using smart phones or computers. Although learners were quick to adapt to using technology, which has been observed amongst many of the learners at Arthur Mfebe SSS, there were learners who did lag behind and struggled with using technology. This became a hindrance in their learning process, especially in cases when they were given tasks that required the use of tablets. Moreover, learners did not get training on how to integrate the use of tablets in their learning process. The technical staff member noticed:

> *"Some of them they think that when using tablets they don't need books ... all they know is that we have tablets".*

The learners did not have the guiding process on how to use tablets as a tool for self-study to facilitate their learning process. For example, it would be beneficial for learners to have some mentoring on how videos can be used along with their textbook or online books, and class notes to enhance their understanding on the taught content. One teacher acknowledged:

> *"Even though there is technology, it does not replace the teacher, and the teacher should be there to guide the learners on how to use it".*

However, learners did not formally have this support. Moreover, the district often has their own programmes that they run for the schools (teachers and learners). These programmes are separate from the ICT4RED initiative, which does affect the time element for training and project activities. For example, learners would have school subject specific camps over the weekends and therefore, will not be available for extra ICT4RED project related lessons with teachers. The technical support staff member, who also came from a teaching background, offered the Grade 12 learners assistance on how to use tablets and also how to study using tablets. He mentioned,

> *"I was just taking them through how they can use the tablet or watch the videos and learn on their own so that they can have some sort of self-study. Because, they do not know about those things."*

A common theme that came across from the interviews was that the teachers do not have the time to teach the learners on how to utilise the technology. The teachers felt that their teaching load is high and therefore, they are unable to assist the learners on ways to utilise the technology. Most of the teachers interviewed further felt that the learners are quick to adjust to technology. Therefore, teachers felt it was not a major hindrance to the learners learning process. Learners are also able to work together and help each other with different tasks on their tablets, which also enhance their collaborative skills.

4.1.4 Attitude, Motivation and Behaviour

The assessment of Strategic Value identified immediate outcomes that could be categorised under the following psychological factors: *attitude, knowledge, awareness, skills, motivation,* and *behaviour*. A key outcome of the ICT4RED initiative that is equipping Arthur Mfebe SSS to enhance teaching and learning is the Teacher Professional Development (TPD) training that has been provided. Through the training, further outcomes emanate that position teachers and learners to achieve the goal of enhanced education at the school. In the long term, impacts emerge from the identified outcomes that can be further categorised as part of the Empowerment and Livelihood theme. The following outcomes were identified from the assessment of Strategic Value: Ownership of the Project, ICTs and Emerging Possibilities, Teacher Professional Development Training, Technical Capacity Building, Interest Shown in the Initiative, and Change in Learner Enrolment at the School.

A) Opportunities

Interest shown – Teachers

Teachers have demonstrated an interest in the overall Teacher Professional Development training that was offered. They were excited to be a part of something that the whole school engaged in and did not want to feel left behind from the current technology trend and the use of tablets for teaching and learning. One technical staff member noted that despite the initial resistance that teachers may have, they eventually do come around. As everyone is moving towards incorporating technology in their everyday lives one would not want to be left out. Moreover, teachers were motivated to remain within the teaching profession as a result of the "tablet" trend that is occurring in the area of Cofimvaba. They felt as though they were being given attention and were being equipped with new skills they did not possess before. A great motivation came from the idea of earning one's tablet rather than gaining it for free. The training environment created was a space for fun, collaboration, and encouragement. There were comments indicative of the interest the teachers had in the overall training atmosphere, such as:

> *"Interesting and informative. It was very much educative,"* and *"I really liked her style of teaching because she would add humour, you see, and jokes, and we would dance."*

Therefore, teachers engaged with the training and were more motivated to complete all the modules in order to earn their tablets.

The district officials that were interviewed had the view that teachers were excited about the ICT4RED initiative. They felt that teachers demonstrated enthusiasm and were motivated to take part in the programme. One district official noted the following:

> *"Wow they are very, very enthusiastic about the project and it has also motivated teachers who were thinking twice about continuing with teaching as there are many teachers according to the statistics, that were leaving the system"*

It was observed that through the programme that district officials mainly engaged with teachers during the badge assessment upon module completion, during some training sessions, during the handover of tablets, and during the graduation ceremony once teachers had successfully completed all the training. These different moments in time, when district officials interacted with teachers as part of the ICT4RED project, were moments of

excitement and motivation. It was a common space where all the teachers were learning together, being assessed together or graduating together. Therefore, the atmosphere was one where teachers were driven and excited to complete the training and earn their tablets. As a result, the view of district officials is not surprising. Whereas, from a teacher perspective there have been cases where they talked about the lack of motivation and enthusiasm of teachers. Beyond the training, badge assessment, and tablet awards, environment teachers were faced with the reality of now implementing all that they have acquired into their own context. This is the point where the excitement levels of some teachers dropped. One teacher noted the following:

> *"Teachers somehow have an impression that the activities are just for them to get accessories and other benefits related to tasks but not as teaching strategies to be implemented in class so as to ensure quality teaching and learning"*

It was found that teachers who had passion and were willing were the ones who made use of the tablets and made effort to integrate the tablets as part of their teaching strategies. They therefore were keen to learn how to use tablets and apply the skills they acquired to their own classroom context. For example, one teacher indicated that they preferred the use of ICTs rather than pen and paper as it saves time. Teachers were also motivated when learners come to lessons having gone through material on their tablets and were ready to engage in classroom activities. Learners showing interest in using tablets in class was seen to motivate teachers even more. Some teachers felt encouraged that their learners were becoming more active in the learning process and, therefore, they felt that they (teachers) were on the right track to integrating tablet technology in the classroom the way the project anticipated. Teachers who showed a keen interest also indicated that they experienced some of the benefits of using tablets in their own teaching practices. For example, one teacher felt that even if she was not around she was able to assign her learners some tasks on their tablets or even record the entire lesson and send to her learners. Through this process, she was interested in learning more ways in which technology could enhance her teaching experience. Moreover, it was noted that as the teachers gained confidence in their use of technology they displayed greater desire to utilise their skills.

Interest shown – Learners

The learners at Arthur Mfebe SSS have shown enthusiasm in using tablets as part of their learning process. They have an interest in technology in general and the use of tablets, which

is new at the school, created a sense of curiosity in the learners. Therefore, there was an atmosphere of excitement to use and play with these new gadgets. Learners were eager to learn with technology as it was the only time they truly interact with the technology and had time to play with it. They had a view that tablets simplify their learning process, for example, saving one's work on one device rather than having multiple textbooks. Moreover, the learners felt free to take more ownership and initiative in their learning process. They were able to access their own material from the server and direct their learning beyond the teacher's instructions. For example, a teacher mentioned, *"even the kids like this ICT thing"*. The learners' excitement was further demonstrated in cases where learners approached their teachers to show them what they had learned on their tablets or new content they came across on their tablets. According to the technical assistant at Arthur Mfebe SSS, the more dedicated learners often approached him to request him to upload question papers or practice tests for particular subjects.

According to the teachers interviewed, the learners enjoyed to see the teachers attend lessons with tablets. They become excited and appreciated that their teacher knew how to use tablets and incorporate tablets in the lesson, rather than depending solely on textbooks. The learners' behaviour in class had also changed. In the past, during free lessons or when the teacher was absent from class, the learners would often make noise. With the introduction of tablets, learners would be found busy on their tablets even in the absence of the teacher. Learners have a more positive attitude towards learning and tend to put in effort in their work as they consider the traditional methods of learning to be boring. One teacher indicated that as the learners learned new ways of utilising tablets for their learning they become more motivated to continue utilising the technology. Given that the tablets were meant for Grade 11 and 12 learners, the lower Grades have also sparked interest in the use of tablets. There have been cases where Grade 9 and 10 learners would borrow tablets from the other Grades to use. However, the practice of borrowing tablets has been discouraged to ensure that learners are kept accountable for the tablets and that no damage occurs.

The interest shown in the use of tablets by some learners has sparked interest to pursue technology related fields and technical subjects as well. For example, the technical staff member at Arthur Mfebe SSS mentioned:

> *"Some few ones they do come and say I want to be like you. Yeah I tell them that it is possible"*

Such interest in vocational work does open opportunity to expand the project into other avenues as well. There are learners who are not academically advanced and a staff member suggested that it would be an advantage to the area of Cofimvaba if they also offered technical skills training for those learners who do not complete the final year of high school or make it to University. The interest to pursue ICT related studies was also revealed by one of the badge assessors who indicated that through the project she discovered that she enjoyed working with technology and as she says:

> *"Even myself if the time was not against me because am aging now I would have done my masters in ICT".*

Increased learner enrolment

The most significant change, according to the project target recipients, that has been noted at Arthur Mfebe SSS is the increased enrolment rate at the school. Learners in the area have been keen to go to Arthur Mfebe SSS where they will gain the opportunity to also learn with tablets and make use of technology. Much like teachers, the learners also do not wish to be 'left out' from the technology trend that is occurring in the area and other parts of South Africa. Even the learners attend school on a more regular basis because they all want to use their tablets at school. Learners already enrolled at Arthur Mfebe SSS also take pride and ownership in their tablets. One teacher mentioned that:

> *"This is a rural area they all want to come to Arthur Mfebe because they get tablets and it is a pride. I hear when they go for their winter school they are showing off their tablets."*

The school is gaining attention as a result of the "tablet initiative". The learners' attention is drawn to the technology itself and not necessarily the desire to improve education through the support of technology. However, there is a view that parents are excited and have hope that with technology being introduced at the schools then the quality of their children's education will also improve.

Interest shown – Community

Parents and community members who do not attend school have also shown an interest in the ICT4RED initiative and appreciated the introduction of tablets at Arthur Mfebe SSS. Parents were excited that their children are being exposed to new ways of teaching and learning much like in the urban schools. Parents were happy that their children were not being left behind,

which they felt is the case when one stays in rural areas. They were relieved that they would not have to spend money and time to travel into Cofimvaba town or Queenstown for their children to access computer labs. It was also noted that this was only common among the more literate parents as those that came from a poor educational background did not understand the value of technology and accessing the Internet. For them the project was not as exciting as it was for those parents who had some idea of what technology entails and its benefit to the school. One teacher mentioned:

> *"Those who are literate are so proud, but for illiterate they don't know what you mean by the wi-fi, what you mean by internet, how will my child benefit from this, so it needs a lot of teaching even from the parent".*

The amount of hype created by the introduction of the project has inspired other schools who were not part of the project to also acquire their own technology to expose their learners to what is happening in other areas. They have been able to see the hype at Arthur Mfebe SSS and also want to experience that similar environment as well. One subject advisor highlighted the following:

> *"Even those circuits which were not in the project they are so interested that some schools have bought their own gadgets and they have started to share some information with those who are in the project"*

The community itself has also shown interest to the extent that they would also like to gain computer skills and make use of tablets. One teacher was approached by a community member who mentioned that:

> *"It will be wise if these people started with them (the community) to train them".*

Through the ICT4RED project, the community within the vicinity of Arthur Mfebe SSS was being exposed to different possibilities of learning and would like that opportunity to engage with technology as well. Moreover, the community was recognising different avenues of development and change that could take place in their area. People valued what was happening and had the perception that with tablets and the level of attention the school received results in education of a higher standard compared to the past. This warrants further investigation in people's interest in learning prior to the introduction of technology and after technology had been introduced. For example, a teacher was approached by a learner who dropped out of school saying:

"I want to come back, I wish I could come back and study again because in our time there were no gadgets".

In this particular case, this community member is demonstrating their keen interest to be a part of the stream of learners who learn through technology. The level of interest shown by the community and the school learner is a positive attribute that the ICT4RED project was welcomed by the community and they recognised some value in what the project is doing in the area.

Interest shown – District officials

The district officials and the subject advisors had indicated, through the interviews, that they enjoyed working as part of the ICT4RED initiative. One district official showed her interest in the whole initiative:

"Because they give us wonders in our schools".

They recognised that there had been a gap in the way of teaching and learning in the schools and, therefore, appreciated the work that the project was doing. Through the interviews, there have been several comments and interest shown to keep the project operating for some time. Another district official indicated that officials:

"... want the sustainability of this project for the whole circuit".

Not only were they interested in what was happening at their schools, but they had the desire for the expansion of the project to other schools as well. Such interest aids in keeping the project alive, given that the district officials/subject advisors will be at the forefront managing the project from the year 2015 onwards.

B) Shortcomings

Low teacher morale

Despite the keen interest shown by teachers to engage with the training programme and the aims of the ICT4RED initiative, there are cases where teachers have been lacking motivation to use the tablet technology as part of their teaching strategies. One teacher indicated that there are cases were teachers are not committed and are passive and do not make the effort to utilise their new skills. They lack the passion and as one teacher put it:

"Teachers are lacking the drive to use the computer".

The lack of passion and drive affected their ability to use the tablets for teaching as they merely viewed them as tools for personal use, such as WhatsApp and taking pictures. One teacher went further to say:

> *"They are not even motivated to use this thing because to them it is useless. It's just for WhatsApp and taking pictures".*

Therefore, tablets will either be left at home or only used every other day. Teachers then need that extra push and motivation to actually utilise the technology in order to experience the benefits

It was also noted that it is important for the school management to be driven and enthusiastic about using technology, so that teachers too can be motivated to use the tablets. However, one comment that arose during the interviews was the dissatisfaction by one teacher that the headmaster of the school was passive about the entire project, therefore, the teachers do not have an external obligation to use the tablets while teaching. This particular teacher felt that when the top management is fully invested in the project, it paves the way for the teachers to also invest in the whole initiative. There was a view that teachers were discouraged to use the tablets because they did not know how to incorporate them in their own personal context. They also feared using the technology because they did not know if they were on the right track. For example, a common theme that came through all interviews with the teachers was that teachers often would lack understanding on how to apply the skills they learned and as a result they become discouraged and defeated by the whole idea. They did not see the value of the skills they had nor were they able to contextualise their skills. One staff member at the school noted the following:

> *"If these teachers can have a better understanding of this they will begin to love it they will have confidence because once you have confidence in yourself then you want, you always up for a challenge"*

During the training and workshop activities there was sufficient support and guidance, and people worked in groups and collaborated, and once the training was complete that support structure was no longer as solid. Therefore, the teachers were faced with the task of translating their new teaching strategies to their particular subjects, which as one teacher put it:

> *"is a daunting task so it is discouraging"*,

especially during those times when the ICT champions are not available at the school to provide assistance. However, when they see how others are utilising the tablets in their specific subjects and seeing the evidence of how others are being supported in their teaching through the use of tablets, they develop a more positive attitude towards the use of tablets in the classroom. For example, one teacher mentioned:

> *"If you saw somebody teaching using a tablet maybe using another technique maybe you have not really acquired the skill you ask that person to assist you how do you do this help me so we kind of helping each other."*

Such a statement reinforces the notion that at times the teachers do not know how to apply the skills they learned through the TPD and require follow-up assistance to aid them in integrating technology in their teaching.

Technical hindrances to tablet use

Teachers felt discouraged to utilise tablets for teaching purposes due to a variety of technical hiccups. There is limited access to the Internet, which makes it difficult to share information that one has acquired from alternative sources. For example, one teacher felt demotivated when she was not able to share the various information she gained from the Google summit she attended. She felt that she was being selfish when she was not able to connect to the Internet to share the information she had with the other teachers. Furthermore, the poor connectivity at the school demotivated one's use of the Internet. From the interviews with teachers, they indicated that it became frustrating when one would like to access information from the Internet for teaching purposes or share work with learners but was limited or unable to. Teachers then resorted to their old ways of teaching where no technical challenges are experienced.

Trying to manage and control the access to Internet at the school has been a problem. The technical staff member tried to limit Internet access to certain devices at certain times. However, learners then felt it was unfair that some students had access to the Internet while others did not, even if those that required it were for academic reasons.

Increased enrolment creates challenges for the school

The high interest by learners to attend school at Arthur Mfebe SSS does create several challenges at the school. It was highlighted during the interviews that with the high enrolment rate it meant that the limited resources available at the school had to be shared amongst a

larger group of learners. For example, the school was understaffed and the large increase in learners meant the workload for each teacher would increase. Moreover, the school had limited textbooks available for learners. As the tablets were limited to Grade 11 and 12 learners, the lower grades still rely heavily on using textbooks. With more learners joining the school, more learners are then forced to share textbooks. Moreover, in the initial stages of the project the high enrolment rate at Arthur Mfebe SSS meant there was a decrease in enrolment in other schools. Learners were being drawn away from other schools to attend Arthur Mfebe SSS. It also created a sense of jealousy among other learners in the nearby areas. Given that the ICT4RED project is continuing to expand to other schools in the Cofimvaba area this negative effect may change overtime.

4.1.5 Summary of Outcome and Impact – Strategic Value

Table 1 outlines a summary of the outcomes and impacts for the "Strategic Value" theme. The assessment of Strategic Value gives rise to findings that are observable as a direct result of the ICT4RED project. Therefore, they represent the immediate effects (outcomes) of the project services on Arthur Mfebe SSS. These findings are associated with the short-term changes that are taking place in the community with the aim of achieving desirable development goals. Over time, these outcomes result in long-term impacts that are observed through the assessment of Empowerment and Livelihoods.

Table 1. Summary of findings – Strategic Value

Outcome		Outcome Type	Outcome Expectation
Knowledge and Awareness	Awareness of different possibilities of technology	Positive	Unexpected
	Awareness of the services offered by the ICT4RED project and project ownership	Positive	Expected
	Perceptions of discrimination	Negative	Unexpected
Skills Development	TPD training	Positive	Expected
	Technical capacity building	Positive	Expected
	Learners have limited formal training	Negative	Unexpected
	TPD training limited	Negative	Unexpected
	Teaching strategies not utilised by teachers	Negative	Unexpected
Motivation, Attitude and Behaviour	Motivated to improve ICT skills	Positive	Expected

	Interest shown by teachers, community members, District officials and learners	Positive	Expected
	Increased learner enrolment	Positive	Unexpected
	Low teacher morale	Negative	Unexpected
	Technical hindrances to tablet use	Negative	Unexpected
	Increased teaching load due to increased enrolment	Negative	Unexpected

4.2 Empowerment

4.2.1 Purpose

Empowerment can be seen as the ability to positively transform people's lives. It involves expanding people's knowledge, enhancing people's confidence, enhancing their decision making, and enhancing their access to and management of resources (Alsop, Bertelsen & Holland, 2006). Alsop, Bertelsen and Holland (2006: 1) define empowerment as:

> *"The process of enhancing an individual's or group's capacity to make purposive choices and to transform those choices into desired actions and outcomes."*

This capacity to make and transform choices is influenced by two factors, namely, agency and opportunity structure (Alsop et al., 2006: 10). *Agency* involves making intentional choices and having the ability to bargain with institutions in the market, civil society and the state. People's choices and capacity to make choices is influenced by the *opportunity structure,* which influences people's ability to transform their choices into action (Alsop et al., 2006: 11; Gigler, 2004: 7). Together agency and opportunity structure have the potential to bring about different levels of empowerment.

The fundamentals of empowerment are reflected in Sen's capability approach, whereby, human development is viewed as expanding people's capabilities and achievements. This includes expanding what people are capable of doing and being given the resources they have available (Sen, 2013). In order to evaluate the effects of the ICT4RED project towards the empowerment of teachers and learners in Cofimvaba, one needs to understand how information and knowledge enhanced individual and collective capabilities to achieve improved teaching and learning opportunities, and therefore, a better education and ultimately a better lifestyle (Gigler, 2004: 9; Grunfeld, 2007: 10). Such an approach relies on

the basis that the capability of teachers and learners to achieve a level of teaching and learning that is of value is influenced by their resources (capitals) of which "informational capital" is a part (Gigler, 2004: 9). Therefore, information can act as an agent to strengthen teachers and learners' assets in multiple ways (Alsop et al., 2006: 17; Gigler, 2004: 9; World Bank Group, 2012: 41). The assessment of Empowerment focused on whether ICTs have enhanced teaching and learning at Arthur Mfebe SSS through either strengthening the teachers and learners *informational, social, and human capabilities* (Gigler, 2004: 13). These three capabilities make up the sub-themes for Empowerment.

4.2.2 Informational Capabilities

Informational capabilities seek to understand the extent at which ICTs enhance people's informational assets. An assessment of informational capabilities is important seeing that strengthening informational capabilities can strengthen other forms of capabilities to achieve enhanced teaching and learning. Data on information literacy, use of information, and generation of information by teachers and learners is useful to understand whether one's informational capabilities have been enhanced (Gigler, 2004: 14; Wieman, Gast, Hagen, and Van der Krogt, 2001: 10).

A) Opportunities

Access to educational material

Through the ICT4RED initiative learners have an alternative mode of accessing information. They are able to download educational content from the server to assist them in their learning. Often learners access past exam papers, online textbooks, material shared by their teachers, and video tutorials. The learners had identified that the most accessed content from the server were past exam papers and revision papers for their subjects. Learners appreciated this feature, as they were able to prepare for the exams and revise accordingly, to the extent that they want more revision papers to accommodate all their subjects.

The school had been experiencing problems with a shortage of textbooks and learners being required to share a limited number of textbooks. Moreover, teachers were limited to the amount of photocopies they could make for certain sections of books due to a shortage of paper as well, at the school. For example, an English teacher had a problem, whereby she had to copy a poem for her learners to discuss in class. She had 145 learners but was limited to making only 10 copies due to the school's restrictions to cut costs and paper usage. The limited copies made it difficult for her to actively analyse the poem with all the learners. With

Internet access at the school and a server that has been setup through the ICT4RED project this English teacher merely uploads poems onto the server and all learners download the work onto their tablets. Instead of sharing textbooks each learner had the opportunity to be more active in their learning and also engage with the course content by accessing electronic textbooks. The school has now bought into the idea of purchasing electronic textbooks for their subjects. Learners are also able to learn in the absence of the teacher. They are able to access material at any time and work on exercises, or watch video tutorials without the presence of the teacher. This has opened new channels (opportunity for continuous learning) for learning that are not limited to a particular lesson time or even school time. Learners also access video tutorials online, especially for the Science subjects.

Several teachers noted that ICT4RED project is a Maths and Science project. Therefore, the majority of the content loaded onto the server is for Maths and Science, hence most videos accessed are for these two subjects. The video tutorials assist the learners by augmenting what they had been taught in class. Video tutorials also became useful in cases where the learners were not able to conduct certain experiments in class due to a lack of the appropriate equipment or resources. For example, Arthur Mfebe SSS teaches agriculture, however, at the time of this research the school did not have the appropriate equipment to conduct the sheep and beef cattle practicals. The learners then made use of YouTube tutorials (on their own) on the various sheep and beef farming techniques so that they could at least cover most of the curriculum as outlined by the Department of Education. The Agricultural Management Practice (AMP) teacher showed concern that there was insufficient content on the server for the Sheep and Beef cattle farming. She further acknowledged that if there was more content she would utilise technology more actively in her teaching.

Application of knowledge

Learners made use of their tablet skills to generate their own content and make a repository of various materials that could assist them in their learning. They made use of their tablets to make videos of class activities to go over during their revision sessions. For example, the learners would take a video of the Science experiments in class. They would then access these videos at any time when they were conducting their revision work. Despite these efforts by learners there was a continued desire amongst the teacher for the learners to get to a stage where they fully applied the information and knowledge they gained from the Internet.

Use of the Internet

Teachers and learners had shown increased interest in using the Internet. It had been observed that they made use of it for personal reasons outside of teaching and learning. They saw it as an alternative way to communicate with friends and family members at a cheaper rate. Teachers made use of the Internet for email and for WhatsApp (instant messaging) purposes. For example, in the early stages of the project teachers used to invite their friends to the school to access the free wi-fi after hours for WhatsApp and for email. They saw it as an opportunity to reduce their costs of communication such as purchasing airtime. As a result, the technical staff member put in a place a system whereby wi-fi access is limited to school hours to avoid the abuse of the facilities.

Learners had a strong desire to have Sim Card slots for their tablets. That way they could purchase data to access the Internet in their own time or at home as well.

B) Shortcomings

Generation of own content

Teachers have been having difficulties with generating their own content for their lessons with the aid of technology. As mentioned earlier, the subject focuses on Maths and Science, therefore there is limited content on the server for other subjects. This in turn requires teachers to actively generate their own content to suit their teaching needs. It was highlighted that Subject Advisors should visit schools more often to assist their teachers with the use of tablets for their specific subject content. One teacher felt that they needed that guiding structure for content generation and motivation on how to utilise technology at the school to best suit their subject. Moreover, it was suggested that the project should expand to cater for other subject content as well. The project champion indicated that even if learners have high Mathematics and Science marks they will still need the other subjects to boost their points to qualify for university. Maths and Science alone will not gain learners sufficient points to be accepted into university. Therefore, much attention should be paid to other subjects, such as the languages to boost learner points. Learners have indicated that they too would appreciate more content to cater to other subjects. One learner specifically suggested that having content such as poetry set work available for isiXhosa and English would improve the learners' reading skills. It was suggested that teachers should be motivated and encouraged to generate their own content by working with one or a few teachers and providing examples on how content can be generated. For example, taking a video of an entire lesson and uploading it on

the server for learners to access. That way when other teachers see how their fellow colleagues are creating their own content it will create a ripple effect in the school and in turn motivate others to also do the same.

Teachers have concerns on the type of content learners can access from the Internet. They are concerned that they do not have control on what learners do on their tablets and if indeed they are using them for educational purposes. For example, one teacher indicated that during class it was possible to find a learner busy on Facebook instead of using the tablets as requested by the teacher. Therefore, the teacher needs to walk around the class as learners conduct their group work or individual assignments, rather than the traditional method of the teacher merely sitting in the front. Moreover, the content that learners download can be for non-educational purposes, which merely takes up bandwidth. The technical assistant has indicated that he is trying to find a way to closely monitor what the learners do on their tablets at all times.

Technical hindrances to accessing information

The wi-fi reception at the school was limited to certain parts of the school. Therefore, teachers were required to be located close to the tablet storage room in order to access the Internet. Moreover, learners had restrictions to accessing the Internet. They had limited times when they could access the Internet, such as when they were required to complete assignments and required online material. They then had to gain access from the technical staff member. Learners complained about the restricted use of the Internet at the school. However, the increased need to make use of the Internet placed pressure on the network bandwidth. The technical staff member had indicated that there was a need to monitor people's use of the Internet at the school. At the time of this research he frequently changed the access details. He suggested that it would be best if learners could understand and value the use of the Internet. He indicated that learners should come to a realisation that the Internet is limited and that they should rather focus on using it for educational reasons

Another factor that limited the use of the Internet was the network bandwidth. The school had limited Internet connectivity and the technical staff member had concerns that learners did not understand the impact of continuously downloading music and videos online that were not related to their academics. Learners did not realise that their constant downloads slowed the Internet down. The school also did not have electricity in all the classrooms. It then became a challenge when teachers and learners were confined to certain parts of the school to

charge their tablets. For example, the Agriculture Management Practice class is held in a building that does not have electricity. The teacher felt that there was no point in using tablets for her subject, as there was no content and also no power source to charge tablets that were on low battery. Although learners could carry their tablets and charge them at the storage room, it became an inconvenience to do so.

As mentioned earlier learners complained that they would prefer it if the tablets had Sim card slots so that they could purchase their own data bundles to access the Internet when they were at home. They felt that with their own data they will not have to be restricted to certain parts of the school to complete any work online. One learner commented:

> *"I advise the ICT4RED team to try and put a Sim card slot in the devices because we are not able to connect to the Internet at home".*

The technical staff member acknowledged that the project is a pilot and therefore they were continuously learning on the best way to manage the technology aspect of the project. For example, the Prestigio tablets that were used had numerous problems. As a result, the project decided to change the tablets for the following phases for the project.

Learners further complained about the restricted use of the Internet at the school. However, the increased need to make use of the Internet placed pressure on the network bandwidth. The technical staff member had indicated that there was a need to monitor people's use of the Internet at the school. At the time of this research he restricted the learners' access to certain time periods and also frequently changed the access details. He suggested that it would be best if learners could understand and value the use of the Internet. He indicated that learners should come to a realisation that the Internet is limited and that they should rather focus on using it for educational reasons

4.2.3 Human Capabilities

ICTs have multiple effects on people's human capabilities (economic, political, cultural, and human capital). People have been empowered to make choices to use their basic computer literacy skills, to enhance their power over different areas in their lives (Alsop et al., 2006; Gigler, 2004; World Bank Group, 2012). Teachers have been able to utilise information from the Internet to assist them in their regular tasks, such as: improving their understanding of material to be taught in class, and gaining confidence in their tablet handling skills. Such activities contribute to the empowerment of people. Therefore, information is acting as an

agent to strengthen teachers' assets, especially their psychological assets, such as, increased confidence in their abilities. This influences their choices to utilise their new basic ICT skills in multiple ways (Alsop et al., 2006; Gigler, 2004; World Bank Group, 2012).

It is important to assess the actual and realised uses of ICTs. It is useful to understand user behaviour and perceptions, and motivation for using ICTs, in order to understand whether they have led to an improvement in people's human capabilities. Human capabilities assess the extent to which ICTs: facilitate and support the capacity to solve problems, strengthen ICT skills and knowledge, improve one's involvement in decision making, and strengthen one's cultural identity (Gigler, 2004: 15).

A) Opportunities

Personal development and Project Management

Through the ICT4RED project teachers not only gained teaching strategy skills but they developed in a personal capacity as well. They gained confidence in their abilities as they utilised tablets as part of their teaching. They became comfortable with handling the technology and as they became familiar with it they developed increased confidence to utilise the technology. They gained a sense of accomplishment, which boosted their self-esteem. One teacher said,

> *"I was developed by the project ... I attended the national teacher awards, I was a provincial winner integrating technology with curriculum that was a big step for me. I said this is wonderful."*

Teachers who had shown great enthusiasm were often selected (by the school) as ICT champions and facilitators for the schools. These ICT champions and facilitators gained exposure to various management skills within the project. They attended workshops on how to facilitate training, which further enriched their own personal development. Through championing the project they demonstrated their leadership skills and sat on the ICT committee that aimed to steer the project at the school. Moreover, the opportunity to work closely with the CSIR team and play a part in the ICT strategy formulation process at the schools ensured that the ICT champions and facilitators gained a sense of ownership of the project. Moreover, teachers who showed a keen interest in the project got selected to be badge assessors during the TPD course training. Through this process they were being empowered to develop in their personal capacity to lead and train others, and manage their

schools progress in the project. Their confidence and self-esteem also increased. For example, one teacher who was selected to be a badge assessor mentioned:

> *"I call myself now ICT champ. I have been taken from the grass root to the sky like this because I knew nothing then".*

Teachers felt a sense of accomplishment to be representing their schools as ICT champions and badge assessors. Their self-management and project management skills are being development through engaging with the ICT4RED project.

Confidence in ICT Skills

Learners at Arthur Mfebe SSS were gaining confidence in their ICT skills through the ICT4RED project. The introduction of tablets at the school was the first time many of the learners were exposed to tablet technology, as many of the learners had not touched or used a computer before. As learners continue to use the technology their confidence in their abilities increased. They became more enthusiastic and began to explore alternative uses of technology at the school. Learners were also proud to own tablets; for example, during their summer camps they took pride in using their tablets during various camp activities. It has been observed that the teachers who made use of the tablets on a regular basis began to grow in confidence in their abilities and shared feelings of pride in their new skills. Three teachers indicated that they had the confidence to explore and utilise technology in alternative ways and their desire to learn more grew.

B) Shortcomings

Shortage of qualified teachers

It was noted that at Arthur Mfebe SSS there was a limited number of teachers. As a result, some teachers were required to teach extra subjects that they had no prior training in. The ICT champion mentioned,

> *"We have teachers who teaching subjects who are not qualified to teach those subjects that is causing high failure ... hence I'm saying technology does not replace a teacher".*

These teachers had difficulties teaching their subjects and they felt that the use of technology exposed their lack of knowledge on their subject content. They felt that the use of technology opened doors to new content and subject material that would confuse them or require more

effort to understand. Furthermore, when learners accessed information online, the teacher would then be required to learn the same content accessed by learners in order to assist them appropriately when required to. Moreover, when teachers had difficulties understanding the content they also had difficulties integrating tablets in their subject. It was suggested by the project champion that teachers required further capacity building, both for their particular subject and in their technology literacy skills.

4.2.4 Social Capabilities

A key dimension of community empowerment is enhanced social capabilities. Assessing social capabilities encompasses similar dimensions to that of human capabilities at a much broader perspective that incorporates the community. Poor communities at times gain power through forming groups and attaining a shared vision and goal (Gigler, 2004: 16). Social capabilities assess the extent to which access to and quality of basic services has improved, economic opportunities have been promoted, participation in the political system has improved, and whether the community's identity has been enhanced (Gigler, 2004: 19).

Information has been used as an agent to strengthen the networks among the schools in Cofimvaba and the interaction of teachers between different schools. People have been provided with added channels of communication. The TPD training conducted for teachers has opened a different platform for teachers and district officials to get together and interact. Furthermore, it has opened opportunities to find out what is happening in different schools in the district. Such opportunities have empowered teachers to explore new ways of communication and expose themselves to different techniques of teaching (Also et al., 2006; Gigler, 2004; World Bank Group, 2012).

A) Opportunities

Increased collaboration and communication

Through the ICT4RED project the teachers at the school collaborated more with their colleagues and neighbouring schools. At the time of the outcome and impact assessment, Arthur Mfebe SSS was the only school that had a technical staff member who could assist with any technical support required through the project. As a result, the Phase 2 schools would all come to Arthur Mfebe SSS to get assistance with their tablets. Moreover, during these visits they were able to interact with other teachers and share their experiences with using tablets at their schools.

As part of the TPD training the ICT champions at Arthur Mfebe SSS had been involved in assisting with the training. Through this process the ICT champions built relationships with various teachers from different schools. They also gained insight on how other schools were integrating technology and leveraged on the lessons learned from different schools. During training and during the assessments, teachers assisted one another with their work. They had the opportunity to share their strategies for teaching and they learned from one another. For example, the teachers created WhatsApp groups to assist each other with various challenges they encountered during their journey to integrating technology in their teaching. Moreover, the ICT champions at the school had the opportunity to attend various workshops and conferences around ICTs. Through these conferences, they had created networks and built contacts with other teachers and experts in the field of ICTs and education. An ICT champion indicated,

> *"ICT also it gave me opportunities to link with people outside, like when I got those opportunity to go to those conference and everything,...you see with the twitter people are very generous"*

Through these conferences and workshops teachers had the opportunity to collaborate with people outside of their workspace. They had been able to network and share ideas on how best to utilise tablets for their specific subjects. From the observations made the, two ICT champions appreciated the opportunity to attend such events. They indicated that it was a good opportunity for them to grow and see what the rest of the world was doing with ICTs so that they too could learn from them.

The TPD training offered teachers the opportunity to express their views and opinions through various media such as Twitter, WhatsApp and discussions after each training session. Teachers had the opportunity to then contribute to how the training should be conducted and to voice out any of their concerns. Some teachers were afraid to always voice out their opinions after training sessions; however, they felt more comfortable to discuss any concerns via WhatsApp. These different feedback mechanisms created a culture of interaction among the different teachers from different schools. Teachers continue to interact and work together by making use of the various social media platforms they were exposed to during the training. Moreover, teachers had been introduced to different ways of communication, for example, email, blogging, and Twitter. For example, some teachers did not own an email account prior to the training and now they all have email accounts and use them to correspond with the

Department of Education. Moreover, teachers had observed a change in the way learners engaged during lessons. The new teaching strategies that teachers had been exposed to required learners to have more group activities and interaction. Therefore, as learners used their tablets they interacted with one another more. Learners also helped one another with various tablet tasks; for example, when one was not sure of how to perform a certain task on the tablet, they would approach another learner for assistance.

4.2.5 Summary of Outcome and Impact – Empowerment

Table 2 below outlines a summary of the findings for the assessment of "Empowerment". There have been cases where there have been no impacts identified yet as a result of the outcomes observed. The ICT4RED project has only been in operation for two years at the time of the outcome and impact assessment. Therefore, it has been noted that long-term impacts will take time manifest.

Table 2. Summary of findings – Empowerment

Outcome		Outcome Type	Outcome Expectation	Subsequent Outcomes	Outcome Type	Outcome Expectation
Informational Capabilities	Access to educational material and application of knowledge	Positive	Expected	Access to information to enhance learning such as past exam papers	Positive	Expected
	Increased use of the Internet	Positive	Expected	Reduction in travelling time and costs to Cofimvaba town and reduced communication (email) costs	Positive	Expected
				Increased Bandwidth	Negative	Unexpected
	Limited informational literacy: information dissemination, content generation and information assimilation	Negative	Unexpected	Limited integration of ICTs in teaching	Negative	Unexpected
	Technical hindrances to accessing information	Negative	Unexpected	Limited use of tablets in classroom	Negative	Unexpected
Human Capabilities	Confidence in ICT skills	Positive	Unexpected	Apply skills to personal context	Positive	Expected
	Shortage of qualified teachers	Negative	Unexpected	Limited application of teaching strategies	Negative	Unexpected
	Personal development of teachers	Positive	Expected	Teachers augment their teaching with online material	Positive	Expected
Social Capabilities	Increased collaboration amongst teachers and schools	Positive	Expected	Increased school interaction	Positive	Expected

4.3 Livelihoods

4.3.1 Purpose

Livelihoods can be broadly defined as a means of making a living (Parkinson and Ramirez, 2006: 4). One's livelihood is influenced by the vulnerability context (external environment) in which one resides. Various trends, seasonality and shocks (for example, economic trends, natural and human health shocks and seasonality of employment opportunities) have a direct impact on people's assets and the various strategies they have available to achieve livelihood objectives they desire. These livelihood objectives are what people seek to achieve and can change depending on the context, time, environment, and people (DFID, 1999; Duncombe, 2006: 83; Parkinson and Ramirez, 2006: 4).

It is important to understand how ICTs have affected ones wellbeing, the way people live their lives, protect themselves against vulnerability, and provide new opportunities for an improved future. Assessing livelihoods would look at how ICTs have aided in building the assets of teachers and learners at Arthur Mfebe SSS and enhanced their teaching and learning strategies, to achieve desired livelihood objectives, in this case improved education (DFID, 1999; Duncombe, 2006: 83; Parkinson and Ramirez, 2006: 4).

4.3.2 Facilitation of day-to-day activities

A) Opportunities

Change in learning habits

Learners had shown signs of engaging with their learning more deliberately. It was noted that as they continued to utilise their new skills they continued to learn alternative ways tablets could be used to augment their learning. It had been noted that learners were engaging in more group work as the type of teaching strategies teachers had been exposed to through the ICT4RED project encouraged learner collaboration. Tablets also kept learners occupied even in the absence of the teacher. As mentioned previously, learning new skills encouraged them to continue using the tablets, which in turn motivated them to improve their academic performance. As one teacher noted:

> *"Their attitude is so positive, they will improve, they will improve because they engaged directly ... it's a big step for a learner, to Bluetooth to your teacher, to submit, to talk with your teacher even if they are not in front of you by recording*

tasks, that is a big step for them so at least they are motivated, they work harder at least."

Teachers who made use of tablets in their teaching and who applied the teaching strategies had identified new learning areas of opportunity for their learners. For example, one teacher identified that through the mind mapping strategy learners were able to sharpen their essay writing skills and structure their thoughts into paragraphs. Learners were also able to improve their presentation skills. Learners were being more active in their learning process. Moreover, learners were exposed to alternate ways of learning Maths. For example, the Maths teacher used the 'Angry Birds' game as a way to introduce functions in Mathematics. Learners also developed the habit of taking pictures of calculations from the blackboard rather than writing them out. That way they had more time in class to discuss and work out calculations rather than spending time copying from the blackboard. Moreover, the teacher also uploaded work onto the server for the learners to work on. There was a number of preloaded Maths content on the server and learners were able to access numerous materials to assist them in their Maths skills. Through the Nokia More Maths programme the learners had been accessing online assessment and practice material. The teacher had also been able to track their progress.

There has also been a change in the way learners organise their learning materials, specifically the Grade 12 learners. Grade 12 learners had indicated that the introduction of tablets had helped reduce their load of carrying textbooks to schools. They now have lighter bags as they can access material from the server or online.

Change in teaching habits

Teachers who had shown interest in the tablet initiative were finding ways in which the technology could suit them. For example, despite the limited content for the isiXhosa subject, the teacher began to utilise the tablets to enhance local content on the isiXhosa culture. The isiXhosa teacher used her tablet to capture events of various isiXhosa ceremonies, and then showed her class as a way to kick-start her lessons.

The Maths and English teacher had started to create their own content for their subjects, which they shared with their learners. For example, the English teacher acquired content online and tailored it to her subject which she then projected to the whole class during the lesson. Teachers who regularly made use of the tablets also accessed material online to

enhance their understanding of the content they taught. For example, the Agriculture teacher indicated:

> *"Sometimes the textbook is maybe not clear so I am able to check on the Internet even Google pictures ... so in order to explain to learners you have to be clear so I Google everything maybe pictures".*

Moreover, during the badge collection stage (assessment of TPD modules) Subject Advisors also had the opportunity to identify how their teachers (the subjects they advised) were performing in terms of the actual content taught. One subject advisor noted,

> *"Even for the badge assessors they should come because if you are the specialist in that subject you are going to help your educator to say if you are going to do the story telling in technology take this topic will be easier".*

She was able to gauge the teachers' progress in terms of the actual subject matter and any challenges they experienced. She is then also able to guide her teachers appropriately on how to utilise the technology and also specific advice geared to the content itself.

B) Shortcomings

Limited availability of content

There were concerns raised with regards to the lack of appropriate content for all subjects on the server at the school. The majority of the content on the server was catered for the Maths and Science subjects. The teachers for non-Maths and Science subjects felt that due to the limited content on the server their learners did not utilise their tablets for learning. They felt that the way to get learners to use tablets was if there was appropriate content on the server. Teachers also felt demotivated to use their tablets for teaching when there was insufficient content for their subject loaded on the server. The ICT champion further added:

> *"They are not even motivated to use this thing because to them it is useless it's just for WhatsApp and taking pictures."*

One teacher mentioned that since there was limited content for her subject she had to type out notes or some information to upload to the server so that learners could access that information. It appears that the school was still at the initial stages of technology integration – representational use of technology, whereby, teachers literally transferred their skills of using textbooks to that of a tablet. They saw tablets as a means of merely displaying information –

replacing paper textbooks with electronic textbooks. For example, one teacher had problems with the tablets because:

> *"It takes time to page and then change you going, unlike the book because the book you just* [demonstrates flipping through a textbook quickly] *and this must be the easiest way?"*

Therefore, tablets were merely seen as devices for electronic textbooks as teachers were still in the early stages of applying what they had learned from the training. This would align with the 'Applying' development stage from the ICT4RED project Monitoring and Evaluation Framework. It is partly understandable given that the ICT4RED project was birthed from the need to have electronic textbooks due to the shortage of textbooks at the schools and the challenges faced with delivering textbooks to schools (Herselman and Botha, 2014).

Several teachers and learners had indicated that the pre-loaded content on the server was outdated and was not up to date to the South African syllabus. It made it difficult for learners to then download content from the server as they viewed it as irrelevant to what they were learning. One solution would be for teachers to generate their own content and load it onto the server for their learners. However, several teachers had difficulties generating their own content. Moreover, the process of generating content required time and effort from the teacher's side. One teacher indicated that teachers lack the drive and motivation to make an effort to generate their own content. As discussed previously, not all the teachers knew how to generate their own content and for those that did know they did not have the drive or passion to do so. It was suggested by the IT champion that the more effort teachers put in, the more confidence and motivation they will have. Teachers will then in turn continue to use the technology more.

Limited time available

Teachers at Arthur Mfebe SSS who did not utilise the tablets on a regular basis also felt that it took time and dedication to prepare for lessons that involved the use of the tablets. They felt overloaded with their current schedule. Therefore, preparing lessons that integrated technology added more to their load, which then became discouraging as well. The time factor has been found to be an issue especially when teachers were behind with their workload and planning. Two teachers indicated that:

> *"Technology it's bringing some extra work some extra duties to teachers".*

Extra effort and time is required for the teacher to appropriately prepare lessons that will make use of technology in class. Teachers become unwilling to take up more time from their schedule to prepare for class. For example, another teacher noted:

> *"The most very much discouraging thing because it takes time".*

The technical staff member suggested that it would be best to demonstrate to teachers how their work will be made easier through the use of technology including tablets. That way they will appreciate technology more and in turn start using it more regularly.

Limited use of technology in the classroom

It had been observed that only few teachers made use of the tablets in the classroom and when they did use them it was only at a representational level rather at a generative level. Beyond the lack of understanding of subject content, it was also noted that some teachers were computer illiterate and therefore, they had difficulties utilising technology effectively for teaching. Teachers who did not use the tablets for teaching often did not see how the use of tablets could be integrated within their subjects. As one training facilitator noted:

> *"Teachers don't know how to clearly integrate. They want to treat it as separate".*

Some teachers also had difficulties using the Internet, as they did not know how. They were not familiar with it, which limited their ability to enhance their teaching or change their way of teaching. Besides having difficulties applying teaching strategies using technology and lack of motivation (as outlined previously), most teachers felt that learners could cheat when they had access to technology. For example, there had been concerns that learners would be able to find test or assignment answers online. One teacher, however, indicated that learners should be allowed to access the Internet and those teachers should not fear learners accessing answers. The teacher advised that it would best to allow learners to make use of the Internet and rather learn to acknowledge their sources fully and appropriately rather than copying work verbatim. Furthermore, some teachers felt that when learners worked in groups or made use of the new learning strategies, the learners copy from each other. For example, one teacher acknowledged that lessons were still being conducted in the same way. She mentioned:

> *"Learners are still seated that way. Someone who has come and ask why you sitting this way you going to copy. Then you must face the front all of you".*

In such cases it appeared that teaching was about a mere transfer of information and therefore, the use of technology was merely to access information and relay that information back to the teacher. As a result, teachers who are concerned about learners cheating saw technology as an alternate means of transferring tests or assignments answers.

The use of tablets at the school focused on the Grade 12 learners; therefore, all attention was on Grade 12 learners and their use of tablets for learning purposes. Therefore, the lower Grades such as Grade 11 did not gain that exposure to fully integrate tablets in their learning. Moreover, Grades 8 to 10 had a limited number of tablets available to them. It was common to find four learners sharing one tablet. One teacher was concerned that when more than two learners share a tablet it was common to find that only one or two of them engaged with the work provided. The other learners then become mere spectators. The teacher then found it difficult to ensure that everyone had understood as some learners were overshadowed by the more dominant learners. Eventually, it made it difficult to integrate the use of tablets in their teaching when there was a limited number of equipment available.

The use of the Internet was limited to teachers, while learners had to gain permission and access to the Internet from the technical staff member. Therefore, learners depended on accessing content from the server that was pre-loaded. As a result, if there is no content loaded on the server for their particular subject or if the teacher did not load any content for that subject the learners then did not utilise their tablets as much.

Technical challenges to tablet use

There had been technical hindrances that had been preventing teachers from utilising their tablets for teaching purposes. For example, the tablets tend to freeze, speakers do not work, Bluetooth problems, teachers have difficulties highlighting text on a tablet, and screens go blank randomly. Such technical hiccups discouraged both teachers and learners from using tablets in the classroom. They felt that it was demotivating to put in effort preparing for lessons and only to find that the technology fails when it is time to teach. One teacher suggested that it would be best if teachers had the opportunity to master the use of tablets first, before they start applying new teaching strategies with the aid tablets. They had the view that there was insufficient training on actual ICT skills, especially for teachers who had not used a computer or handled a tablet before. They therefore felt that it was a contributing factor to limited use of tablets in the classroom by some teachers. Beyond the limited knowledge and understanding of how to use tablets, some teachers also did not have an

understanding of the subject content that they taught. Therefore, it became difficult to use technology for that particular subject.

4.3.3 Summary of Outcome and Impact – Livelihoods

In order for ICTs to be utilised in such a manner that enhances one's livelihood, one does require further resources such as finances, skills, infrastructure, social resources, knowledge and motivation. These resources are important if one is too evaluate the information and knowledge gained through ICTs and apply it to a particular context (Duncombe, 2006). Some teachers who have been provided with the Teacher Professional Development training are even motivated to make use of the skills gained. However, as mentioned previously a large number of teachers do not have the knowledge or skill to apply the new teaching strategies to their context to enhance their teaching. Only some teachers (33%) have applied the new teaching strategies in their particular contexts. They are the ones who are usually more enthusiastic and self-motivated to seek new livelihood opportunities, and have a level of awareness of how to apply this new knowledge to their lives. Table 4 below outlines a summary of the outcomes and impacts for the "Livelihood" theme.

Table 3. Summary of findings – Livelihoods

Outcome		Outcome Type	Outcome Expectation	Subsequent Outcomes	Outcome Type	Impact Expectation
Facilitation of day-to-day activities	Change in learning habits	Positive	Expected	Perceived improvement in education standard - (requires an assessment over time of learner performance.)	Positive	Expected
	Change in teaching habits	Positive	Expected			
	Limited availability of content	Negative	Unexpected	Limited use of tablets for teaching	Negative	Unexpected
	Limited use of tablets in the classroom	Negative	Unexpected	Minimal integration of technology in the classroom taking place	Negative	Unexpected
	Technical challenges to tablet use	Negative	Unexpected	Limited use of tablets for teaching	Negative	Unexpected

4.4 Sustainability

4.4.1 Purpose

Sustainability aims to determine the means and ways in which an ICT4D initiative has contributed towards sustainable development (Balancing Act, 2013; Unwin, 2009: 365). ICTs can bring about positive effects on communities. However, there are also indirect negative effects that encourage unsustainable trends that do result (Souter, 2012: 4). An ICT4D initiative should then put measures in place to ensure that these negative effects are resolved.

Evaluators should assess the mechanisms put in place that will support and ensure that positive outputs, outcomes and impacts are sustainable and not short lived (Batchelor and Norrish, 2006: 16; Souter, 2012: 4). A challenge arises when attempting to find a balance between maintaining and supporting something, in such a manner that it does not fail in the midst of a constantly changing rural environment (Ali and Bailur, 2007: 3; Batchelor and Norrish, 2006: 16; Hilty and Hercheui, 2010: 229; Souter, 2012: 2). Therefore, it is suggested that there be a shift in focus from creating sustainable artefacts (the technology itself) to sustainability of a concept (outcomes and impacts of the technology). Emphasis should then not be placed on the ICT4D initiative being sustainable, but instead should focus on the sustainability of the outputs, outcomes and impacts of the project or programme it supports (Ali and Bailur, 2007; Batchelor and Norrish, 2006: 16).

Sustainability provides insight into whether the positive effects of *Strategic Value, Empowerment and Livelihoods* are long lived and do not result in unsustainable results. Sustainability determines whether the outcomes and impacts for all other themes are able to cope with the constantly changing rural environment and project context, and do not undermine other community goals and objectives.

4.4.2 Sustainability Outcomes

5.4.2.1 Management of the project

The management responsibilities of the ICT4RED initiative are being taken over by the Eastern Cape Department of Basic Education (ECoDBE) from the CSIR. The Department is anticipated to manage the acquisition of technology for the district, expansion of the project to all the circuits in the District, and manage the training of teachers in the area to ensure continuity of the project. Two district officials indicated that there are quite a number of

responsibilities for them to take over, which they felt was slightly overwhelming. A major concern was the funding required to maintain the initiative. The department has a limited budget that is set. Therefore, each school is limited in terms of how funds are allocated and how those funds can be spent. Each school then has to rely on their own funds to manage the tablet initiative at their school (Meyer and Marais, 2014). At Arthur Mfebe SSS, resources (financial, personnel, and management capacity) are limited.

Teachers are not quite sure what implications the handover process entails. They demonstrated concern especially for the training aspect of the project and the maintenance of tablets, for example, the repair of damaged tablets and any software upgrades. Teachers were concerned that the department will not be able to cope with providing adequate training the same way SchoolNet (outsourced by the CSIR team) has managed to. It has been planned that the ICT champions at the schools, existing facilitators from each school and the Subject Advisors, will be conducting the training and the assessment involved. However, some teachers have the view that the quality of training will decline. One facilitator mentioned that the DoE might not put in as much effort into the training as the CSIR did. Moreover, she felt that the Department officials will not be equipped and skilled as the CSIR, in order to effectively conduct the training. She reiterated:

> *"The government don't have the amazing work we have got from the project directly. I still maintain we are the best because we were trained by the project".*

There are fears about the Department of Education managing with sustaining the project in their own. For example, one teacher put it as:

> *"I'm nursing fears even with the trainings. Will the department manage to sustain, that is another question".*

There is no budget to have the training outsourced, and by using the Subject Advisors this would reduce project costs. The district officials indicated that the training and assessment of teacher performance falls within the scope of the Subject Advisors' job description and therefore, they should not require funds to conduct the training. As for the ICT champions, they may require funding as they will be conducting the training at their own capacity and own time. In general, teachers are interested to see the initiative continue in Cofimvaba. As noted by one district official:

"Last week we had a meeting with them for the continuity and the sustainability of the project, and they came in numbers".

It was also noted that the project content needs to be updated if the project is to continue in the future. Currently, there have been concerns that the content on the server is not up to date with the DBE curriculum. Moreover, as the majority of the teachers have difficulties generating their own content, sustainability then becomes a concern. Teachers suggested that more training should be provided that would assist them with contextualising the training and generating their own content. However, this was not in place or planned as yet.

5.4.2.2 Project Resources

Funding

Within the District office itself and among the teachers and subject advisors there was some level of uncertainty with regards to the funding aspect for sustaining the project. One subject advisor commented, *"It might be the top management who knows or they have not yet captured it clearly what will they do. Their future plan, but on our level will wait for them".* There were some concerns that the funding aspect may put strain on the department to maintain the supply of tablets, the maintenance of tablets, the training of teachers, the continuous assessment of teachers, the purchase of online material, and WIFI connectivity costs. Moreover, the increased need for security at the schools to prevent theft of tablets, increased school costs as well. Schools had to set up alarm systems and put security measures in place to ensure that tablets were not stolen.

Human Capital

The CSIR ensured that they involved different stakeholders from different levels of management, such as teachers, principals, subject advisors, district officials, and ensured that they were aware that the project would be handed over to the DBE from 2015. They had been given the opportunity to be actively involved in the running of the project, which ensured that the DBE and schools were aware of what was required from them to take over the project and sustain it for the future. For example, the ICT committee at Arthur Mfebe SSS had to produce strategy documents on how they would manage the project. Through this process, the CSIR team was also available to assist in some aspects with the planning of these strategy documents. Moreover, the school has an ICT committee to keep the 'fire burning' for the project and ensuring that teachers are motivated. However, it was noted that only a few of the committee members have been committed to keep the project running. There has been some

discouragement within the committee itself, which was not surprising given that one teacher who was part of the committee mentioned that they required the drive and the push to keep the project up and running at the school.

For the expansion of the project, there was a need to provide continuous follow up training. From the various discussions made, there appeared to be a need to have follow-up training for teachers and guidance on how to integrate the use of technology within their subjects. The ICT champions and subject advisors were tasked with assisting teachers; however, teachers felt they needed a more formalised process for continuous training that would ensure the consistent use of technology in the classroom. Moreover, with continuous training taking place there is continuity at the schools to use technology in the classroom, even if staff members leave or retire, the new staff members will also have the opportunity to be exposed to the training and utilise technology in their teaching.

There will be youth deployed to each school that will be trained to play the role of technical assistants at the school, for any technical related queries. These youth will be funded by the Department of Rural Development. Moreover, two district officials indicated that the DBE has its own technicians for the district who go out to the schools to assist with any computer related queries. It has been found that these technicians have been employed for the few schools that offer computer studies as a subject at their schools.

The Department of Education has had a busy schedule and had difficulties aligning the project with their own work. There is now concern that once the CSIR steps down they will experience difficulties managing the full control of the project. Currently, it has been observed that the DBE has not incorporated the ICT4RED initiative as part of their role. They see it as an extra project above their own projects rather than being a part of their main mission for education in the area. For example, one teacher mentioned:

> *"Government officials tend to relax and they accept everything but implementation always clashes with their year plans. For example, district officials are supposed to be part of the assessment just like myself because they are going to be with teachers right through. By the end of last year we were collecting badges for six sections I could not find them".*

In this example, this particular teacher raised the issue of district officials being occupied with their own work that does not involve the ICTRED. The added workload as part of the

ICT4RED project does draw time away from their allocated tasks for the year. Therefore, the project appears to be extra work for the DBE. Furthermore, the skills aspect is another concern teachers had. They viewed that the DBE did not have sufficient skilled members who will be able to manage the project.

For the continued sustainability of the project, it was suggested that more human capital that is enthusiastic about the project needed to be employed. The successful integration of tablets in teaching and learning requires people that are motivated to bring about change. Moreover, all stakeholders from all levels need to be motivated. Therefore, the school has an ICT committee to drive the project and keep teachers motivated. Motivating and encouraging teachers was identified, from the interviews, as an important aspect to ensure teachers apply the skills acquired during the TPD training. The presence of an ICT committee since the inception of the ICT4RED project is to encourage project ownership by the school and community. Therefore, the schools have been aware from the onset that they (DoE and the schools) would take over the project in 2015. The ICT committee also sits regularly to track the progress of the project and discuss their monitoring plans for the project. Having such discussions at the school ensures that the school is looking to the future and working on how to sustain the project for the long term. One aspect that stood out from the interviews with teachers and subject advisors was the need for continued monitoring of the project in order for the project to continue in future. Teachers at the school are recognising the importance of assessing the teachers' progress in integrating technology at the school in order to see effective change taking place. One subject advisor acknowledged:

> *"It is very, very important because you would not know what has actually happening if you do not have a stage where you say assess the people".*

There is a perception among the district officials that the technology at the school is there to stay. One district official noted that we live in the 21st century world, which is continuing to utilise technology, therefore even if there is minimal impact with the project, ICTs will remain part of the schools in the area to keep up with the rest of the world.

Textbooks

The ICT committee has noted that the purchase of electronic textbooks will require funds, which will be diverted from existing funds for textbooks. The school will then use those funds to purchase licence codes for electronic books, which learners can access from the server. That way, the school will also be in a position to purchase books that are set by the

DBE and are in line with the current curriculum. As the curriculum gets updated, the school will only require purchasing new licence codes. This also offsets the cost of distributing physical textbooks to the school and the costs of replacing damaged physical books as per the traditional way of conducting work.

Tablet maintenance

The CSIR continues to encourage the school to put in place an internal arrangement for the management of the project. The ICT committee for Arthur Mfebe SSS was required to draw up IT strategies on how they would manage the maintenance of tablets. For example, outlining the procedures to be followed for damaged tablets. At the time of the outcome and impact assessment there were discussions put in place to charge learners a small handling fee for the use of tablets. At the end of the school year, learners would then be reimbursed the fee charged upon returning the tablets in good working condition. However, the amount considered is negligible as compared to the cost of repairing broken screens, for example. The committee was also in the process of making plans to discuss the fees for tablet use with parents.

There have been concerns raised with regards to the security of tablets at the schools. Therefore, as one subject advisor commented, the schools have to set up their own security measures, such as putting in place alarm systems. However, this means that the schools will be using their own school budget to do so. It does create more costs for the schools, especially when all schools get a set budget for their learner and teacher resource materials required. Teachers are also concerned that when learners take tablets home, they will become easy targets for theft. Once community members are aware that learners take their tablets home, it opens the risk of potential theft occurring. Teachers fear that besides theft taking place, learners may damage their tablets or break them at home. Already they have had cases where learners did not return tablet chargers. One teacher mentioned:

> *"Their teachers fear that they will even break the device and there's security risk. They don't allow children to take them home – they are not sure whether they will come back".*

Therefore, the ability to take tablets home to complete assignments or work is quite limited at the school.

The ICT champion highlighted that the limited budget of the school makes it difficult to sustain the purchase of new equipment and the repair of damaged equipment in the long term. The ICT committee was tasked with drawing up plans in terms of how they will manage the budget well aspect for maintaining the project, which has been a challenging task for them. They are not convinced that they will be able to manage in terms of the funds needed to maintain tablets for the school. However, with regard to the scalability of the project, Vodacom has been on board to supply tablets to the remaining schools in the District where the project will be expanded. Vodacom will only be providing tablets to the Secondary schools in the region. Once again, the lower grades will have limited access to tablet use and emphasis will continue to be on the Grade 12 learners.

The charging of tablets has been a concern for the school. An example made by one teacher was that there would be about 400 learners making use of tablets during lessons and once the school day comes to an end all 400 tablets need to be charged, which requires human capital. Moreover, the charging of tablets affects the electricity bill at the schools, which does require the school to spend more of their own funds to maintain such a system.

4.4.3 Summary of Outcome and Impact – Sustainability

Table 4 outlines a summary of the findings for the assessment of "Sustainability".

Table 4. Summary of findings – Sustainability

Outcome		Outcome Type	Outcome Expectation	Subsequent Outcomes	Outcome Type	Outcome Expectation
Continued management of the project	DBE will take over management of the project	Positive	Expected			
	Fears that DBE will not cope	Negative	Unexpected	Low confidence in the DBE from teachers	Negative	Unexpected
	Presence of an ICT committee at each school	Positive	Expected	Put in place strategies for the continued operation of the project	Positive	Expected
Project costs	Limited school budget available	Negative	Expected	Challenge sustaining project financially	Negative	Unexpected
	Increased costs for schools-tablet maintenance, security, electricity and training	Negative	Expected	Possibility of project time span being shortened	Negative	Unexpected

Outcome		Outcome Type	Outcome Expectation	Subsequent Outcomes	Outcome Type	Outcome Expectation
Project funding	Levels of uncertainties of funding availability	Negative	Unexpected	Challenge sustaining project financially	Negative	Unexpected
	Creation of networks with government departments	Positive	Expected	Possibility for more funding	Positive	Expected
Presence of human capital	Subject advisors and ICT champions to provide training	Positive/ Negative	Expected/ Unexpected			
	ICT committee for each school	Positive	Expected	Implement strategies for the continued operation of the project	Positive	Expected
Maintenance of tablets	Internal maintenance of equipment planned	Positive	Expected	Local capacity developed	Positive	Expected
Availability of educational material	Need for suitable content/some content outdated	Positive/ Negative	Expected/ Unexpected	Low integration of ICTs in teaching	Negative	Unexpected

Chapter 5: Conclusion

An outcome and impact assessment aims to describe the effects the ICT4RED project has on the Cofimvaba District, specifically Arthur Mfebe SSS. The key themes that have been assessed in the ICT4RED project include Strategic Value, Empowerment, Livelihoods and Sustainability. The assessment of Strategic Value aids in identifying how the Arthur Mfebe SSS has been equipped to achieve the goals that they value. It was found that teachers, Subject Advisors and District Officials have been provided with Teacher Professional Development training with the aim of enhancing 21st century skills. However, for many teachers a major challenge has been the limited guidance and lack of awareness on how to tailor those new skills to their specific subjects. The assessment of Most Significant Change as a method aided in identifying what project offerings teachers and learners considered to be of most value. It was found that a significant change in the school has been the increase in enrolment of learners at Arthur Mfebe SSS. The assessment of Empowerment aided in identifying whether the teachers and learners' informational, human and social capabilities have been enhanced. It was found that the presence of the ICT4RED project has influenced the teachers' way of interaction between various schools, the way in which learners accessed information, and the teachers own personal development. However, it was found that this only applied to those individuals who were self-motivated and had the passion to utilise the

tablets and the new teaching strategies. The assessment of Livelihoods aided in identifying whether there has been a change in the way learners learned and a change in the way teachers taught. There has been some evidence of teachers who integrated the use of tablets in their teaching, such as the Maths teacher at Arthur Mfebe SSS. However, there was a general view that technology was time consuming and teachers had difficulties generating their own content and contextualising the new teaching strategies to their own context. The assessment of Sustainability aided in identifying the ways in which the ICT4RED project plans to continue its operations after 2015. Generally, it was found that teachers required continued training support beyond the allocated 10 modules to ensure that full integration of ICTs took place at the school. That way the ICT4RED project would continue to be appreciated by the schools and make impact in the district. Furthermore, the funding aspect of the project continues to be an area of concern, given there is a set budget allocated to each school. The project will then need to seek alternative sources of funds to ensure it is financially sustainable. The results from the report provided a general overview of the outcomes and impacts of the ICT4RED project on Arthur Mfebe SSS in Cofimvaba. These results allow for the emergence of further in-depth investigations. For example, further study into offering contextualised TPD training could provide in-depth understanding into how the ICT4RED project can be improved and providing support to teachers on their subject content and the use of ICTs within their subjects.

References

Ali, M., and Bailur, S. 2007. The Challenge of Sustainability in ICT4D – Is Bricolage the answer? *Proceedings of the 9th International Conference on Social Implications of Computers in Developing Countries*. May 2007, Sao Paulo, Brazil. [Online] Available at: http://www.ifipwg94.org.br/fullpapers/R0010-2.pdf. [Accessed 26 March 2012]

Alsop, R., Bertelsen, M.F. and Holland, J. 2006. *Empowerment in Practice: From analysis to implementation*. [Online] The World Bank. Directions in Development. Available at:

<http://siteresources.worldbank.org/INTEMPOWERMENT/Resources/Empowerment_in_Practice.pdf.> [Accessed 24 September 2013].

Balancing Act. 2013. Rescue attempt on poorly performing telecentres in South Africa. *Telecoms, Internet and Broadcast in Africa-Balancing Act,* 340. [Online] Available at:

http://www.balancingact-africa.com/news/en/issue-no-340/telecoms/rescue-attempt-on-po/en. [Accessed 24 November 2014].

Batchelor, S. and Norrish, P. 2006. Framework for assessment of ICT pilot projects: Beyond Monitoring and Evaluation to Applied Research. *Information and Development Program.* [Online]. Available: <http://www.infodev.org/en/Publication.4.html> [Accessed 04 April 2012].

Department for International Development (DFID). 1999. *Sustainable Livelihood Guidance Sheet Section 2, DFID, London* [Online]. Available at: <http://www.livelihoods.org/info/guidance_sheets_pdfs/section2.pdf >[Accessed 19 March 2012].

Duncombe, R. 2006. Using the livelihoods framework to analyse ICT applications for poverty reduction through microenterprise. *Information Technologies and International Development*, 3, 3, 81-100.

Gigler, B.S. 2004. Including the excluded: can ICTs empower poor communities? Towards an alternative evaluation framework based on the capability approach. *4th International Conference on the Capability Approach.* University of Pavia, Italy, September 5-7, University of Pavia.

Grunfeld, H. 2007. Framework for evaluating contributions of ICT to capabilities, empowerment and sustainability in disadvantaged communities. Paper presented at the *CPRSouth2 (Communication Policy Research) Conference, 'Empowering rural communities through ICT policy and research'*, Indian Institute of Technology (IIT) – Madras, Chennai.

Hamel, J. 2010. *ICT4D and the human development and capabilities approach: the potentials of information and communication technology.* Published in: Human Development Research Paper Series (HDRP), Vol. 37 (2010), 1-77. [Online] Available at: http://mpra.ub.uni-muenchen.de/25561/. [Accessed 26 March 2012].

Hamel, J. 2010. *ICT4D and the human development and capabilities approach: the potentials of information and communication technology.* Published in: Human Development

Research Paper Series (HDRP), Vol. 37 (2010), 1-77. [Online] Available at: <http://mpra.ub.uni-muenchen.de/25561/.> [Accessed 26 March 2012].

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, South Africa. Pretoria: CSIR Meraka.*

Herselman, M. and Botha, A. 2015. Evaluating an Artefact in Design Science Research. Paper presented at the South African Institute of Computer Scientists and Information Technologists (SAICSIT). September 28-30, 2015, Stellenbosch, South Africa. DOI: http://dx.doi.org/10.1145/2815782.2815806.

Hilty, M. and Hercheui, D.M. 2010. *ICT and Sustainable Development* (Report 328). Queensland, Australia: IFIP International Federation for Information Processing.

Hodgkinson-Williams, C. 2006. *Revisiting the concept of ICTs as "tools": Exploring the epistemological and ontological underpinnings of a conceptual framework*. [pdf]. Available at: http://itforum.coe.uga.edu/paper88/Hodgkinson-Williams-2006rev.pdf.> [Accessed August 2015].

Meyer, I.A. and Marais, M.A. 2014. Sustainabiliy and Value through Improved Decision-Making. In: M. Herselman. and A. Botha. 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: CSIR Meraka. 215-248.

Parkinson, S. and Ramirez, R. 2006. Using a sustainable livelihoods approach to assessing the impact of ICTs in development. *Community Informatics*, 2, 3, 116-127. Available at: http://ci-journal.net/index.php/ciej/issue/view/15. [Accessed 26 March 2012].

Sen, A. 2013. The Ends and Means of Sustainability. *Journal of Human Development and Capabilities: A Multi-Disciplinary Journal for People-Centered Development*, [online] Available at: DOI: 10.1080/19452829.2012.747492 [Accessed 04 February 2014].

Souter, D. 2012. *ICTS, the Internet and Sustainability*: (A discussion paper, 28 May 2012). Manitoba, Canada: International Institute for Sustainable Development.

The Local Economic Development Publication for South Africa (LEDSa). 2011. Growing and weaving with ICT: The Siyakhula Living Lab and Reed House Systems. *The Local Economic Development publication for South Africa,* August-September. p18.

Unwin, T. 2009. *ICT4D-Information and Communication Technology for Development.* Cambridge: Cambridge University Press.

Wieman, A., Gast, L., Hagen, I. and Van Der Krogt, S. 2001. *Monitoring and Evaluation at IICD: An Instrument to Assess Development Impact and Effectiveness.* Report no. 5, The Hague: International Institute for Communication and Development (IICD), April.

World Bank Group. 2012. *ICT for Greater Development Impact-Information and Communication Technology.* [Online] World Bank Group Strategy. Available at: http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/WBG_ICT_Strategy-2012.pdf. [Accessed 11 September 2013].

RHODES UNIVERSITY

INFORMED CONSENT FORM

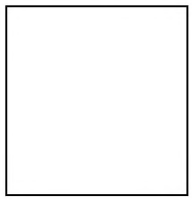
Department of Information Systems

Research Project Title:	"Outcome and Impact Assessment in the Comprehensive Evaluation of Rural ICT Projects in Developing Countries"
Principal Investigator(s):	Hafeni Mthoko

Participation Information	**Initial**
I understand the purpose of the research study and my involvement in it	
I understand the risks of participating in this research study	
I understand the benefits of participating in this research study	
I understand that I may withdraw from the research study at any stage without any penalty	
I understand that participation in this study is done on a voluntary basis	
I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential	
I understand that I will receive no payment for participating in this study	

Information Explanation	**Initial**
The above information was explained to me by:	
The above information was explained to me in: ☐English ☐Afrikaans ☐Xhosa ☐Zulu ☐Other: and I am in command of this language **OR**, it was comprehensibly translated to me by:	

Voluntary Consent
I, , hereby voluntarily consent to participate in the above-mentioned research.

Signature:	**OR**, right hand thumb print  Witness signature:	Date: / /

Investigator Declaration	
I, Hafeni Mthoko, declare that I have explained all the participant information to the participant and have truthfully answered all questions ask me by the participant.	
Signature:	Date: / /

Questionnaire Sample

Details of Interview

Name of Interviewee:_____

Date of Interview:_____

1. Village:_____
2. Position in household:_____
   (head, husband/wife, son/daughter, son/daughter-in-law, brother/sister, brother/sister-in-law, grandchild, grandparent, other)

Section 1: Demographics and general
Please choose one option per question by marking with an X

3	**Gender**				
	Male		Female		
4	**Age group**				
	Less than 18 years	18-30 years	31-40 years	41-49 years	50 years and above
5	**Highest educational level reached**				
	No formal education	Primary education	Secondary education	Tertiary education (Beyond secondary)	
6	**Employment status**				
	Employed	Unemployed	Self-employed (own business)		
7	**I have been trained to use computer services at the School. (Choose one):**				
	Yes	No			
8	**I enjoy the training offered at the school**				
	Yes	No			
9	**I have used the computer services at the school**				
	Yes	No			
10	**I like/enjoy using the computer services at the school.**				
	Yes	No			
11	**If you do use or have used the computer services at the school, how many times do you use them?**				
	2 or more times a day	Daily	weekly	monthly	less than once a month

12	**Do you know what the Siyakhula living lab is for and what it wants to do?**		
	Yes	No	
13	**From your understanding the Siyakhula Living Lab aims to: Please choose more than one option and mark with an X.**		
	Provide access to education		
	Provide health information to solve health problems		
	support people to express/share their views or opinions		
	Assist tourism in the community		
	support Local Arts And Crafts		
	Provide access to knowledge		
	To help different communities to collaborate and communicate with each other		
	To help communication with family		
	To provide entertainment (Games, Music, Fashion, Talking To Friends)		
	Provide information on how to start development projects		

14. ***Section 2: Outcome and Impact Characteristics***

	For each question, please choose ONE response that best matches your level of agreement (mark with an X)	**Strongly agree**	**Agree**	**Does not apply**	**Disagree**	**Strongly Disagree**
14.1	Access to education and knowledge through the Siyakhula Living Lab helps me to make better decisions in my life in general?					
14.2	Taking part in the computer literacy training gives me an opportunity to access enough information to make an informed decision. for example a decision about weather, about a health problem)					
14.3	Access to education and knowledge through the Siyakhula Living Lab helps me understand problems better(personal problems, community needs or difficulties, local arts and craft problems, access to information, education problems, health difficulties, communication problems)					
14.4	Using computers and taking part in the computer literacy training in the Siyakhula Living Lab helps me interact or work together with other people in the community or the country					
14.5	Access to education and knowledge through the Siyakhula Living Lab helps me to know what is happening in the community and the country.					
14.6	Taking part in the computer literacy training through the Siyakhula living lab helps me feel better/positive about myself					
14.7	The computer literacy training and access to knowledge makes me feel disappointed.					
14.8	Sometimes I feel useless when I use computers or take part in part in the computer literacy training in the Siyakhula Living Lab.					
14.9	After taking part in the computer literacy training in the Siyakhula Living Lab I do not feel proud about myself					
14.10	After taking part in the Siyakhula living lab I am able to do basic computer work and access information as good as other people.					
14.11	When I take part in the computer literacy training and using					

	computers in the Siyakhula Living Lab I am satisfied with myself and my abilities.					
14.12	Gaining computer literacy skills and accessing information through the Siyakhula Living Lab helped me and given me opportunities to sell or buy things in a better way.					

14.13 Has the computer literacy training and access to knowledge and information through the Siyakhula living lab helped you increase your income? [Does access to information help you access income in a better way. For example being able to receive money from relatives more effectively, or pension money or grants; buy and sell things better; saving on travelling costs; through your job (e.g. as a teacher or a nurse).]

Yes ☐ No ☐

Please explain how it has or not helped you to increase your income

……

……

……

……

14.14 *Answer this question only if you are employed.*

Has access to knowledge and education and computer literacy training through the Siyakhula living lab helped you in your job or making money?

Yes ☐ No ☐

Please elaborate/explain

……

……

……

……

14.15 How do you share information in the community [Please choose more than one option and mark with an X]

word of mouth		posters	
sms		notices	
call		radio	
email		community meetings	
letters		Public transport	
Other:			

	Please choose ONE response that best matches your level of agreement (mark with an X)	Strongly agree	Agree	Does not apply	Disagree	**Strongly Disagree**
14.16	The computer literacy training and using computers in the Siyakhula living lab has helped me to get information about the					

	different government departments and social services (health, education, labour, home affairs, social services)?					
14.17	The computer literacy training and using computers in the Siyakhula living lab helps me to communicate with different government departments or services (department of education, health services such as clinics)? For example does access to knowledge, information and the Internet help you communicate with home affairs for collection of documents (ID, passport) Please elaborate. …… …… …… ……					
	For each question, please choose ONE response that best matches your level of agreement (mark with an X)	Strongly agree	Agree	Does not apply	Disagree	**Strongly Disagree**
14.18	Does access to knowledge and information through the use of computers through the Siyakhula Living Lab help you become aware of (help you know more about) the political issues in the community, the province or the country?					
14.19	Does computer literacy training and access to information and knowledge through the Siyakhula Living Lab help you take part in political matters?					
14.20	Has access to knowledge and using computers through the Siyakhula living lab affected your Xhosa culture? For example has taking part in the training and accessing knowledge and information changed ways of sharing traditional stories, children consulting the internet for advice and not their elders? Yes ☐ No ☐ If Yes please elaborate. …… …… …… ……					
	For each question, please choose ONE response that best matches your level of agreement (mark with an X)	Strongly agree	Agree	Does not apply	Disagree	**Strongly Disagree**
14.21	Has the computer literacy training and access to knowledge and information through the Siyakhula Living Lab helped you improve your information/knowledge of what is happening in the					

	community? For example transport					
14.22	Has the computer literacy training and access to knowledge and information through the Siyakhula Living Lab helped you improve your information/knowledge of education services in the community?					
14.23	Has the computer literacy training and access to knowledge and information through the Siyakhula Living Lab helped you improve your information/knowledge of health services-(services at the clinics) in the community					
14.24	Does computer literacy training and accessing knowledge through the Siyakhula living lab give people an opportunity to talk about community problems/needs/challenge/ideas? (For example distribute notices on community meetings). Yes ☐ No ☐ If Yes please elaborate. …… …… …… ……					
14.25	Does access to computers and computer literacy training through the Siyakhula living lab help different communities (for example Ngwane and Nqabara communities) to work together/talk to each other/share ideas? Yes ☐ No ☐ Please elaborate. …… …… …… ……					
	For each question, please choose ONE response that best matches your level of agreement (mark with an X)	Strongly agree	Agree	Does not apply	Disagree	**Strongly Disagree**
14.26	Does taking part in the computer literacy training and having access to information and knowledge through the Siyakhula living lab motivate you to improve your life or achieve your goals/dreams/plans?					
14.27	Does access to knowledge and computer literacy training through the Siyakhula living lab help you feel like you are part of the community?					

14.28	Has access to knowledge and information through the Siyakhula living lab helped to protect/preserve your cultural way of living or cultural way of behaving/acting, talking, communicating, and working? Yes ☐ No ☐ If yes, please elaborate. …… …… …… ……					
	Please choose ONE response that best matches your level of agreement (mark with an X)	Strongly agree	Agree	Does not apply	Disagree	**Strongly Disagree**
14.29	Do you use the computer literacy skills and computers from the Siyakhula living lab to show or communicate/demonstrate or teach others about your culture (for example, create website on your culture, creating posters on your culture, designing items for your culture)					
14.30	Do the community and the Siyakhula Living Lab project team and project management work together to run/manage the project and how it works? Please elaborate why or why not. …… …… …… ……					

Interview and focus group schedule-Sample

Interview Schedule: Focus group-Teachers and community members-Sample

Introductions

1. Ice breaker activity
2. Ask people to introduce themselves
3. Explain the purpose of the research
4. Explain rules of communication and participation.

Introductory Questions

1. What do you feel is the Siyakhula Living Lab for? [Probe what is the purpose of the SLL. From your understanding what does the SLL want to achieve in this community]
2. What are the activities and opportunities offered by the Siyakhula Living Lab?

Theme questions

1. What other activities would you have liked to participate in?
2. What day-to-day activities do you do when you come to the computer labs at the schools?
3. Since the start of the Siyakhula living lab have people changed their attitude or behaviour in the community. For example, are people more positive now to find a job; are people discouraged; is there a change in behaviour towards education.
4. Have you learned new skills or improved old skills by taking part in the computer literacy training.
5. Is the computer literacy training through the Siyakhula living lab preparing you to solve community problems such as health problems, unemployment, and teaching?
6. Describe the biggest change that has happened in your community since the start of the SLL (computer literacy training etc).
7. If you could change anything about the computer literacy training, access to information and knowledge and access to computers through the Siyakhula living lab, what would you change?
8. What challenges/problems have you experienced during computer literacy training, using the facilities in the Siyakhula living lab?
9. Does the computer literacy training and access to the Internet in the Siyakhula living lab help you to access information? For example finding information on the internet, using email to ask others to help you with more information.
10. Are you able to create your own information (content) and put it on the internet or print?
11. How do you share information in the community? Including information about your culture.

12. Has the computer literacy training and access to information and the Internet changed the way people in the community communicate/talk to each other or communicate with other communities? If so how? If not, why not? [both negative and positive change].
13. Has taking part in the computer literacy training and access to knowledge changed/affected the traditional ways of communication? If so how? If not, why not? (**combine with previous question**)
14. Has access to information and knowledge through the Siyakhula living lab helped you to take part in community decisions? For example community meeting times. If so how? If not, why not?
15. What other activities take place at the school computer labs.
16. Has access to information and knowledge through the Siyakhula living lab affected the way you live everyday (positive and negative). If so how? If not, why not?
17. Has access to knowledge, information and the Internet helped you see how you can improve your life?
18. Has access to information and knowledge given you the opportunity to improve your way of life? If so how. If not, why not? (**combine with previous question**)
19. Has the computer literacy training and access to information helped the community to work together? If so how. If not, why not?
20. Has access to knowledge and information helped you cope/manage with negative effects in your surrounding environment
21. Are you motivated to continue participating in the computer literacy training and accessing information at the schools?
22. Do you feel the computer literacy training and being able to access information has affected the natural environment? If so, how.
23. Do the community and the SLL project team and management share the resources in the project?
24. Do the SLL project team and the community work together and manage how the training works and providing services to the community.
25. Does access to information and knowledge through the SLL affect the way the community conducts functions, community meetings or things that happen in the community? If so, how. If not, why not?
26. Does the training and access to knowledge and information make some people feel like they are not welcome
27. In the SLL there is computer training, access to information, educational resources……Which activities make you feel part of the SLL or feel included and feel welcome?

Summary Questions

1. Do you feel that the any of the topics discussed today will affect the Siyakhula Living Lab in the future?
2. How would you change the negative things that you mentioned?

Conclusion

1. Is there anything else that we may have left out about the project and what it has done for this community?
2. Is there anything else you would like to add?

Probes:

1. [What other things would you like to do during the literacy training or learn]
2. [Since the SLL began has there been a change in attitude or behaviour towards education, access to knowledge, arts and craft in the community, tourism, health, teaching, collaboration between schools]
3. [Is the programme preparing you to resolve education problems, administration problems, and agricultural problems? If not, why not?
4. None specific
5. [If I come to you and tell you that you are the new boss what would you change]
6. [difficulties with use, with access to training, activities offered]
7. None specific
8. For example can you use the ICTs to talk about and write about your culture, spread information about your business, your community, spreading information about solving health problems, information on ways to farm or information to use in the classroom for teaching; share traditional ways of conducting work etc.
9. [For example, word of mouth, sms, call, email, letters, posters, notices, community meetings]. Which communication channels do you use including traditional methods
10. Has computer literacy training and access to knowledge and information changed the way you communicate with the clinics, teachers, department of education, schools in the area and other government departments.
11. None specific
12. None specific
13. Elaborate. Are there any other skills you would have liked to learn
14. None specific
15. How does the community make use of the SLL to provide other community services? For example, does the community use the SLL labs for meetings or other community projects?
16. For example the way you communicate, the way you manage your health, your problems, your way of teaching, the way you prepare your food, the way you do farming in the community; collaborate with other schools; the way you do school administration.
17. [Have you become aware of different ways to improve your life]. Are you aware that this can be possible? Gain new ideas on ways to change your life or make things (your work, your home) easier for you?
18. None specific
19. None specific
20. (for example droughts, low unemployment rate, health problems, agricultural and farming problems, transport problems, problems with education)
21. None specific
22. For example information on better ways to treat the natural environment
23. None specific TILL END

Interview Schedule: One-on-one interviews with project champions, project team and teachers-Sample

Introductions

1. Basic introductions
2. Explain what the research is about

Introductory Questions

1. What are the activities and opportunities offered by the Siyakhula Living Lab?
2. From your understanding can you walk me through how things work in the Siyakhula Living Lab. [Who does what, how the programme is operated, how are problems solved]
3. What conditions in your surroundings affect the way you live right now? [What conditions in your surrounding environment affect the way you live-weather, employment, crime, education, health and all things happening around you]

Theme questions

Interview Schedule: interviews with project champions, project team and teachers

1. Do you take part in how the training takes place and how the SLL works while providing services to the community? If so how?
2. What activities do you participate in within the SLL? For example do you take part in training? Do you use the computers at the labs?
3. Are you able to use information and knowledge that you access to solve any problems or difficulties that you have?
4. Are you able to access knowledge and information to help you in your everyday life For example training community members; teaching; collaborating between schools; communication with other teachers; selling of craft and art; farming and agriculture; development projects?
5. Do you use the internet and computers to show or communicate/demonstrate or teach others about your culture (create website on your culture, creating posters about your culture, designing things for your culture)
6. Does access to information and knowledge through the Siyakhula Living Lab help with preserving and supporting the xhosa culture
7. Does access to information and knowledge through the SLL still help you even if your community needs are changing?
8. Does taking part in the computer literacy training and accessing information and knowledge motivate you to improve your life?
9. Does the computer literacy training and access to information and Internet through the SLL make some people feel like they are not welcome to also take part?
10. What are the future plans for the SLL?
11. In the future- is the SLL able to manage the cost of running day-to-day for example training and maintaining equipment? How?

12. Is the SLL able to encourage people to continue taking part in the computer training and accessing the labs to access information.
13. Are you aware of any challenges that affect the Siyakhula living lab to continue operating/running?
14. What measures have been put in place to work through these challenges?
15. What measures have been put in place to continue with programme offering(such as information literacy skills, computer skills and knowledge) to the community
16. Do any programme activities contribute towards paying for the financial costs of providing computer literacy training and using the facilities at the labs?

Summary Questions

1. Do you feel that the topics we discussed will affect the Siyakhula Living Lab in the future?
2. Since the programme started what stood out most (mention at least one negative and one positive aspect) for you over the years. [Probe, is it the way the programme is running, the training, the lab facilities, the skills]
3. If you could change anything about the programme what would you change?

Conclusion

1. Is there anything you would like to add or mention?

Probes:

1. None specific
2. None specific
3. [For example if you have difficulties with contacting your relatives, health problems, challenges when teaching, transport issues and difficulties at home.
4. None specific
5. None specific
6. For example do you document your culture and store it online?
7. None specific
8. None specific
9. None specific
10. None specific
11. [What are the cost implications of the above future plans?]
12. So from a cost perspective will the SLL manage to facilitate the computer literacy training offered to develop the community in future? If the community is to take full ownership of the programme, will they be able to manage that cost.
13. None specific till end

Story-telling narratives: Most Significant Change-Sample

Introductions

1. Describe the biggest change that has happened in your community since the project started. Tell us a story of what has been happening in your community since the Siyakhula Living Lab started,
2. If you could change anything about the programme, what would you change? (probe-If you could change the way the programme was managed, the way the project team behaved, the different skills offered, the opportunities given, what would you change from all these things.)

Level 2 Reflective questions-Sample

1. Do you think it is important to know the future plans of the SLL? If so why. If not why not?
2. Do you think it is important to equip and prepare the community to achieve community needs and help develop a community? If so why. If not why not?
3. What changes would you make if you were to conduct this evaluation process? Why would you make these changes?
4. Can you suggest other ways to determine the biggest change that has occurred since the SLL (the computer literacy training and access to computers at the school) started?
5. Do you think it is important to know how to apply the skills you learned to your daily life? If so why. If not why not?
6. Do you think it is important to be able to use technology to help the community to work together? If so why. If not why not?
7. Do you think it is important to be able to use technology to protect your culture? If so why. If not why not?
8. Do you think it is important to be able to use technology to improve your way of living? If so why. If not why not?
9. Do you think it is important to know whether the SLL (the computer literacy training and access to computers at the school) will continue to function in the future? If so why. If not why not?
10. How would you determine whether SLL (the computer literacy training and access to computers at the school) will continue to operate in the future?

Transcript: Interview with subject advisor in Cofimvaba

T = teacher/district official;
S = Student/researcher

(...) = inaudible
/ = speaker interrupted
~ = pause

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
1	T	It's about integrating the ICT in the classroom putting it into action in the classroom in whatever subject is taught to that to integrate with ICT, so it also it's basically for now it's about the IPad or the gadgets used in teaching and learning.	
2	S	Oh okay, and what role did you play in this project like what were you suppose to do or what have you been doing in the project so far?	
3	T	I was assisting in the training all though I was not a trainer but I was also part and parcel of the training and also my main role was to be a badge assessor.	
4	S	Oh okay, may you just explain what the badges assessment is about, [T: come again] can you explain what the badge assessment is about?	
5	T	The badge assessment is about an assessment you checking the work which has been done by the teachers at school, what the teacher has actually done in the classroom then you check if one has taught according to the syllabus if I may say so or according to the teaching plan.	
6	S	okay	
7	T	Then in that teaching plan has she or he integrated ICT has she used ICT in the classroom so it's all about that and then she comes with the work to you where you will assess what she has done through looking at the videos at the PowerPoint presentations and recording where one will record the learners maybe and take some pictures of what has been done, then what we have been doing will exchange the information using the Bluetooth so also even in the classroom the teachers will give the chance to the learners to exchange their work by using that Bluetooth so it has been like that and this also help the schools to learn from each other because when you are busy assessing somebody even other neighbouring schools or schools on that same will sit in a round table then when we assessing one person other people will also be involved but we ask if they are comfortable with that so they agree to that they will also help them to learn the best strategies from each other.	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
8	S	Okay, oh okay so it's basically what you were doing when we came in February this year?	
9	T	It's what we have been doing when you were around	
10	S	Oh okay is the whole assessment process actually important?	
11	T	It is very very important because you would not know what has actually happening if you do not have a stage where you say assess the people, so it also help one in the evaluation of what has been done by the trainers.	
12	S	Oh okay, And then who gets to do the assessment like does the project elect or choose their own people to do the assessment or can teachers volunteer to be assessors or how does the process work?	
13	T	No they said they didn't want to choose the teachers they wanted somebody who is a little bit above their level actually it also helps the subject advisors because they chose us as subject advisors and you will find that you even learn a lot or you can get some information which you needed during the time you are assessing them especially if am assessing my subject Economic and Management Sciences I would easily find that okay this school has taught this and they have done it using ICT and you'll find where people have some gaps and you'll bridge those gaps there and there	
14	S	Oh okay, okay but then since you are the subject advisor do you feel that doesn't it take out time from you schedule to do the assessments for the ICT4RED or does the department actually accommodate for this type of work	
15	T	You asking does the department accommodate us to have that time to go for that?	
16	S	Yes yes	
17	T	Yes because it was the correct protocol was followed that the district director could know and the immediate supervisors that you will be going for this on these dates. They had a proper plan, which would be given quite in advance so that even when you have your own programmes you would know it earlier that by this week I will be busy with assessment so their planning was perfect.	
18	S	Oh okay that's nice, so from your assessments and just your view how do you think the teachers feel about the whole project and the idea of integrating ICTs in their teaching	
19	T	I don't know whether I got well that you saying... okay can you rephrase your question	
20	S	Okay from your opinion how do the teachers feel about the whole project about ICT4RED and using technology, what are their feelings about the project.	
21	T	Wow they are very very enthusiastic about the project and it has also motivated teachers who were thinking twice about continuing with the, with teaching as there are many teachers	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		according to the statistics that were leaving the system but some were held by this project because some other people they didn't know that they have some skill into this or they are so gifted into this ICT project or ICT	
22	S	Oh okay	
23	T	So it has lifted their spirit I think even last week we had a meeting with them for the continuity and the sustainability of the project, and they came in numbers although they had some challenges in terms of technical problems and security things but those challenges they couldn't exclude the enthusiasm they had	
24	S	Oh okay	
25	T	So I can see that this project will continue even in the entire district because it started with only one circuit so even those circuits which were not in the projects they are so interested that some schools have bought their own gadgets and they have started to share some information with those who are in the project.	
26	S	Okay you mentioned about security and technical problems what security and technical problems did the teachers experience?	
27	T	It's the problem of crime around the areas where the schools are (...) you know they try to put some security measures like buglering buglers and so on but you could find that immediately when the community hears but it's not every area, it's not every school in the area but some, so you'll find that in some areas there rate of crime is very high that they immediately when they hear that there are gadgets delivered there were items delivered they will go to that school and try to do the bugglerring, but sometimes they do not succeed because, maybe they are put in a strong room or somewhere like at Khwaza SSS I think that report was put on the ICT 4RED WhatsApp group but even in that meeting we had for the sustainability of the project we talked about those security measures and some of the schools have put the alarm systems, the cameras and other things so as to protect or to give more protection to the learners gadgets.	
28	S	Oh for the schools that put alarm systems and the bugler bars do the schools pay for it themselves or does the department?	
29	T	The project pays for the other part like for the boxes they have some security boxes and they have bugglered some corners and so on but the schools also has taken from their budget to extend or to make more means of security.	
30	S	Oh so the project pays, oh okay does the schools get extra funding from the department since they had to sometimes take out from their budget for such things like security like you said?	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
31	T	They do have their budget for sometimes they have that money for the learner, teacher support material, for the assets or whatever so they take from that budget which is sent to each school by the department remember that schools are (...)phasing 21 schools now their money is sent straight to them so they take from that money, so they are able sometimes to do security measures and some have employed securities.	
32	S	Oh okay... and then I know at some schools like at Arthur Mfebe some of the grade 12 learners they get to take the tablets home, so what happens then for maybe those thieves targeting the learners or wanting to steal their targets to take them home?	
33	T	You saying they were given permission to take them home	
34	S	yes	
35	T	But there were challenges which were there on that because you'll find that some there were stories of being lost, being broken, the screens and some the chargers couldn't be returned and all that those are the reports we found in that meeting but we try to ask them to design some policies around these gadgets and the retention policies like say if a learner brakes it what happens you know, and also that maybe a school might take care of those petty thing which need to be attended to.	
36	S	Oh okay so you mention about having a meeting about the sustainability of the project currently I think Maggie says that this is a hand over stage of the project?	
37	T	Just wait a minute /	
38	S	okay	
39	T	Okay you can talk now [sorry for that]	
40	S	[Laughs] no it's fine, so I remember Maggie was saying that the is being handed over to the department I think round about April May so has it already been handed over or is it still in the process?	
41	T	I can say it's still in the process because they said they will support us they will support us until I think March 2016 actually they, I can say they partly handed it over although they will be around us to assist here and there even they have employed some people in each school to assist into charging the gadgets and also to collect them, give learners assist the teacher in the class room also so they said they will have a training from I think June July and also there is another training coming from the 8 to the 12 of this month so they are still there but partly there.	
42	S	Oh okay, so once it's completely handed over it will be the department' will the department be doing all the training now for other schools and the other circuits and everything and	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		buying tablets and so on.	
43	T	I think so, but there's no... it might be the top management who knows or they have not yet (...)captured it clearly what will they do their future plan but on our level will wait from them what they will say in terms of saying about the trainings in other circuits buying for other circuits and all that or they might find another project to come and assist in connection with that but Vodacom is also coming so maybe Vodacom will assist in other circuits.	
44	S	Okay, and do you feel like the department will be able manage to manage though the next few years somehow in your opinion?	
45	T	I think so because they tried to involve people from different management level and the people who were trained the teacher are still there and also the subject advisors so I think the department will always support to the continuity of this project.	
46	S	Oh okay since you are attended the training with Maggie in your opinion do you think the training was enough or do you think people needed more a little bit more training especially the teachers?	
47	T	It was not as enough like because you'll find that some of the things like social Networks they needed someone to also push him or herself into learning more about them, and also I think there is still a need for a training but we said on that, you will find that sometimes people do not learn on the same level or they cannot learn on the same pace, so you'll find that there are some teachers who know it better that others so that's why we ended up saying they must cluster themselves say if like Nciba is a big circuit so we try to tease it into small clusters so that everybody I mean people can reach each other easily in their small corners and according to their phases and subject.	
48	S	Okay and then through your work in the project have you been able to talk to parents for the learners and find out how...	
49	T	/ [excuse me just a little bit Hafeni] okay we can talk now [laughs]	
50	S	Okay no problem, [laughs] so in terms of your involvement in the project have you been able to interact with some of the parents of the learners to get some of their views and how they feel about the project the parents?	
51	T	No it's not our area of operation that one is for the Principal and the circuit managers so they did that but sometimes they will invite us to come, so it's the Principal who calls the SGB who calls the parents meeting and it was on the advocacy part of the project so they did that before the project even started so as to prepare parents and the community.	
52	S	Oh okay and then from the whole ICT4RED what's the one	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		thing you enjoy most about the project?	
53	T	It was I think this assessment part it was quite interesting to me although initially I said to, I chose actually they said we must choose as subject advisors whether we want to be trainers, to be on change leadership and this one of badge collection and initially I chose being a trainer but Hlengi talked to me later the project manager she talked to me later and then she said she feels that I must be heading the badge assessment and also be the one who is doing that, so this one is the one I like most then the change management also actually all of them the 3 of them but this one because I was very hands on so I like it I like it its worse that the guys from Pretoria they came with a easiest way of doing this badge assessment so even that one also added some interest to me.	
54	S	Okay, what's a changed management about?	
55	T	The change management is about managing this change because people didn't know anything about using actually they knew because they already had laptops but using the iPad and learners having iPad it was not there in Cofimvaba then we had to manage this change and then make people to understand change because some people resist when there is change coming so it's all about that and also managing the change even in the classroom at the school for the teachers at large because you'll find that some teachers might not accept as it comes but somebody has to influence it also has something to do with influencing other people about something new.	
56	S	Okay, what are the some of the challenges or problems you experience in either assessment or change management or anything about the project?	
57	T	One of them it was the school which did not have electricity where we were it was a centre for training and we ended up that school was ended up being changed that centre was changed to the St James center the one (...) the one in town because we had many challenges you'll find that if you are there for training you'll find that the gadgets will be off and then you have no place to charge them or even during assessment one will be when busy presenting the work you'll find that it will just shut down so those were the challenges then also on the change you'll find that not all staff members could accept it easily and move on the same pace but with time and with influence around it people could easily catch up.	
58	S	Okay okay, in your opinion what has been the biggest change ever since ICT4RED what has been the biggest change that you have observed in your circuit, I know at the one school they said that enrolment for an example like Arthur Mfebe	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		really went up because all learners wanted to go to that particular school because of tablets so in your opinion what has been the biggest change or what has change in the circuit about the area?	
59	T	It also united the teachers according to their subjects and you'll find that even when you are were busy with the assessment teachers of your subject could they could choose to come to you because you are the subject advisor for that particular subject they wouldn't, they were so interested to with their work to you, they wouldn't run away from you so they were so confident about bringing their work to the relevant subject advisor, so what I found is that it would be much better if every subject advisor was involved maybe in assessment, and then the assessor maybe for some teachers for maths could be the one who is doing mathematics but even if you do not know the subject you would easily assess what has been done by the teacher and it was also an opportunity to learn more about other subjects and even give the report to the relevant subject advisor who was not on assessment.	
60	S	And if you could change anything about the whole project what would you change?	
61	T	[laughs] I think it's, actually is (...) about the one which or wouldn't change anything but some parts they need innovations like we discussed on the meeting we had that it would be better if we let people would be clustered according to their grades and the phases you know so even that I think we can improve in those things, and also more use of it because you'll find that we have not yet reached the highest point of using them and some teachers they have challenges some which cause them not to use them because like one school said they divide the tablets among themselves and then go with them at home they take them home and you'll find that even at their homes they are not safe, it's about safety I think safety is one the things I will consider and maybe if it starts to other circuits if there's a new circuits that is going to start I think we would start with strengthening security measures before the tablets are delivered to school so example if I can refer back Hafeni?	
62	S	Okay, oh okay, yah	
63	T	In a school I was teaching we were offered desktop by a certain project so that project before they came to deliver the desktop they ensured that the security is there and is up to standard so we first had to renovate that classroom and also make sure that even flooring everything is perfect and also the alarm system so the installation of everything which is in connection with security was done prior I think it's that part	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		which I can change.	
64	S	Okay yes that's true coz I know the one school some teachers mentioned that sometimes after their training they feel like they need someone to be there to help them with the tablets sometime they don't really grasp everything during the training	
65	T	It's what we are planning to do with those clusters and also the visits the on site visits we go to the schools and then we support them on site.	
66	S	Oh okay I was wondering since its only teachers that get the training are the teachers the one supposed to teach the learners how to use a tablet 'cause maybe some learners do not know how to use a tablet so it the teachers responsibility to teach the learners?	
67	T	Yes it's the teachers responsibility but what happens is that they do not actually teach the skill, when they are busy teaching the content the learners also catch the skill	
68	S	Oh okay	
69	T	If I can make a practical example in the desktop in the schools which have computers we said they will not have a subject an additional subject according to the government policy they are not supposed to have 9 or 10 subjects instead of 7 or 8 so they will not add computer as a subject but when one is teaching natural science they will catch the skill during the natural science period and when the content for that particular subject is taught, so I think maybe there can also be some time maybe after school or because during the school hours the period the timetable does not allow that the must a period for computer so maybe the school it can have the extra mile of calling the learners on another time so that maybe they sharpen the skills in the tablet or if there could be some class over the weekend but not during the teaching hours because the kept policy does not allow that	
70	S	Okay, yah it will be nice to have those extra lessons but I'm sure that will also cost more money to pay that person to give those crush course during the weekend and so on.	
71	T	Because sometime teachers do not like to be given an extra job which they are not paid for	
72	S	Paid for, yes that's very true	
73	T	Not unless a teacher is very very committed or its only few people that can do that	
74	S	That are willing to do that, oh okay	
75	T	But so far they do not get problems into making learners to catch the skill while it is, while the content is being taught.	
76	S	Okay, And then do you as well as the subject advisors are you also do you also help the teachers in terms of to how to generate content 'cause I know some teachers use to struggle	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		with generating content using tablet and their own teaching content	
77	T	Yes we also assist them and give them some options they can follow to get more content / [attending a call] sorry for that	
78	S	~ No its fine... so now I have finished all my questions so thank so much for your time. I have random question to ask you is there anyone in the department that deals with the economics?	
79	T	Grade 12 economics	
80	S	Yes	
81	T	Yes there is a subject advisor for that	
82	S	How can we get hold of that person? Or contact	
83	T	Do you want to talk with that person now or later?	
84	S	Later I just need their contact	
85	T	O okay, So what I will do I will go to that person and then talk to the person and then come back to you like say you can that person at a certain time, because I don't think he has cell phone.	
86	S	Okay it won't be about the project it's something else okay thank you so much for your time Sisi Zizi.	
87	T	Okay thank you very much Hafeni	
88	S	I really do appreciate this. Bye	

Transcript: Interview with school teacher in Cofimvaba

T = teacher;
S = Student/researcher

(...) = inaudible
/ = speaker interrupted
~ = pause

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
1	S	I just want you to tell me about the ICT4RED project and what you have done in the project just in general.	
2	T	oh I attended the training sometime last year in June I think the project started in June last year then we graduated then we got certificates from the ICT the ICT people usually came here to give us lectures on how to use the tablets.	
3	S	Okay, Tell me more about the training what did you normally do during the trainings?	
4	T	Oh we were doing some modules they gave us some modules to work on sometimes they will give us something on the storytelling then you'll prepare a lesson on storytelling on how you can incorporate your subject in storytelling like me as I am teaching the language IsiXhosa so I usually use indigenous knowledge from the learners and take some videos and stuff	
5	S	Okay so can you say that sometimes you use tablets to help you with demonstrating about the Xhosa language and Xhosa culture and anything like that	
6	T	Yes Xhosa yah culture I usually because in my tablet I usually if I went to a ceremony a tradition ceremony I take pics and videos there when I want to link that to my lesson I do it because I just show them that and let them say whatever as an introduction whatever they want to say you see then I start it from there.	
7	S	Oh okay so it's sort of helping you to create your content for your lesson.	
8	T	Yes yes	
9	S	Okay, so do you feel that it has motivated you or helped you enjoy your Xhosa lessons a bit more or helped you improve your teaching in the classroom a little bit more or is it just still the same more or less?	
10	T	Yah it has helped me to improve in my teaching because some of the things on the tablet has been preloaded with the information.	
11	S	Oh okay	
12	T	Of which another problem that the tablet has also helped us with is that we have got a shortage of books of resources so we	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		just give the tablets to the learners then if you want to teach maybe it's a poem and you are short of books, photocopy material and stuff you just tell the kids to take a picture of the poem then it becomes easy and you'll say to the learners for notes they can use a rough paper or book to take the notes because they can type on the tablets that's are another disadvantage because they cannot type, and they are using to them into their advantage they are too advanced as compared to us because you know these 20 century learners if you gave them task or homework they don't write it now they are done with writing the homework with pen they just say Miss just give us the paper and they will take the picture of the whole task and do it at home	
13	S	Oh okay... at home okay.	
14	S	So Ma'am have you attended besides the CSIR training like any other ICT training before this one?	*lena*
15	T	No, I don't want to lie.	
16	S	Okay, And how did you find this particular training?	
17	T	It was interesting and informative it was very much educative.	*kakhulu*
18	S	And did you enjoy the style of teaching like what was the approach provided in the workshop?	
19	T	Come again?	
20	S	The approach in providing the workshop was it Maggie who conducted the training? Who conducted the training?	
21	T	Yah Maggie and some other guys were conducting the training but main facilitator was Maggie	
22	S	Was Maggie, So her style of teaching?	
23	T	I really liked her I really liked her style of teaching because she would add humour you see and jokes and we would dance	*Uyabo?*
24	S	She made it fun	
25	T	Yes she made it fun	
26	S	So do you feel like the way that she approached the workshops made you as teacher more interested in using the ICTs	
27	T	She made me interested in such way that I cannot explain, her lessons were interesting.	*zazinikumdla*
28	S	Oh yes okay, so before you went for training you've never used the tablets or the computers for your lessons.	*Itablets okanye icomputers*
29	T	No no	
30	S	Okay. So your passion and maybe your enthusiasm was sparked via that training it was because of the training	*Latraining*
31	T	Yah	
32	S	Oh okay, and do you feel like before you used tablets or ICTs were you confident enough to or lets before that training were you confident enough trying to use them?	*Usebenzise, uzizama uzisebenzisa*
33	T	No I wasn't confident because I was not used in using the tablets I was not used I was not comfortable at first I don't	*Uyabo?*

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		want to lie, then they taught us how to use the tablet then I was comfortable I can now take my tablet to class then I show some pictures then I teach using the tablet you see?	
34	S	Oh okay	
35	T	Like the CAPS document, the CAPS document if there is anything that I am missing out in the policy document I just click it	
36	S	And then you find it there?	*phayana*
37	T	Yah without wasting anytime it is easy its time consuming.	
38	S	But do you feel like other people share your... how you feel like do other people see what you see that it's easy to use these tablets.	*abanye abantu bayayibona lento wena uyibonayo ba kulula ukusebenzisa ezitablet*
39	T	I think the tablet I mean I think scientists, because in a content most content in tablet is Science.	*Abantu bescience*
40	S	Okay, so your content you also have to load it to yourself	
41	T	Yes if have I got something that I want to upload to the server I just go to Gideon and say you must upload this for me like for the serious shortage of books here I even talked to Gideon the ICT Engineer or Technician I told him that it will be cheaper and the principal it will be cheaper if he uploads the books these books?	*Ezincwadi mani?*
42	S	Those books?	*Ibooks eziya*
43	T	no the set works those books to upload to the server so that the leaners can have access to them you see without having to buy the actual copy	*Ha a, ezancwadi, uyabo?*
44	S	Oh okay, the actual book	
45	T	Yah because it will be expensive, it's cheap there because he will buy 1 copy then it will be downloaded and the kids can download it using the server.	
46	S	Okay, So did they actually buy that one copy for the set work?	
47	T	Yah I told the principal, it's in the pipeline they are going to buy it.	
48	S	Okay, are there any challenges since the project has started that you have experienced either problems with tablets not working or problems just general since the project started?	
49	T	I, the only thing I can complain about in the list of our tablets it's not fully loaded with my content I as individual especially the language people to us it's not fully loaded.	*Mna, mna, thina*
50	S	Oh its not fully loaded	
51	T	Some of the things you see it's got some of the things some of the things are not there.	
52	S	Oh okay, And then even with the training did you experience any challenges with the training that you attended or the way	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		the exercises that they did the example that they did do you feel that they could've have done more maybe you needed more time to practise or any problems that you experienced?	
53	T	We needed more time, with the use of technology because am this age	*kaloku*
54	S	[laughing]	
55	T	It's not easy for me even to use a phone I just use what's app and to answer the (hello) and to text only some of the things I didn't know but anyway it helped me to navigate my phone.	
56	S	And then I just want to ask so what advantages have you seen since the school used tablet or in your class room?	*Kusetyenziswe itablet aphe sikolweni*
57	T	Our learners behaviour has changed because when the teacher is not there you will find them when you get there they used to make a lot of noise but now when you get in the class whereas it's not your period you will find them busy on their tablets	
58	S	So they become more proactive	
59	T	Yes yes.	
60	S	Ewe and they take more initiative, why is that though do you think it's because maybe the learning now has changed it shifted its more up to them and that the teacher is not in control as much as the teacher used to be or is it simply because they enjoy technology?	*Ewe Ilearning ngoku itshintshile, okanye*
61	T	They enjoy technology and the content into the, sometimes they will tell you that Ma'am we saw this in our tablets you see?	*uyabo*
62	S	So I just want ask also the challenges that you have experienced maybe when using the tablets in the classroom or maybe I don't know, any?	*Ichalenges Oziexpereincayo, okanye*
63	T	[laughs] Sometime when you are teaching understand? If you didn't I don't know how to put this, the... what's this? That time slot If maybe you have clicked you have opened a page it quickly goes off whereas you are still explaining and you show them then you explain to the leaners when you want to find it when you want to get it back its takes time to get it.	*Nhe, yintoni nalento, latime, mhlawumbi*
64	S	So few technical issues that are time consuming. But there's never like maybe a huge technical problems that you can't deal with?	
65	T	No	*Ha a*
66	S	Because Gideon is also there to help	
67	T	yah	
68	S	Okay are there maybe besides technical problems are there any other maybe internal factors that lead to challenges or that lead to teachers not using tablets maybe support from certain people and things like that or anything, other things that make you not want to use tablets.	
69	T	My reason and the problem that I have with the use of tablets	*Mna ireason*

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		I want that but I don't know what is it called I want to teach I want to... when I am absent I want my leaners to get the information whether it's a task or what whereas am absent I want that I don't know it's an it's a what's this? (...)	*iproblem endinayo, yintonina*
70	S	I don't know	*andiyazi*
71	T	Where you send I've just forgotten some of the things but Maggie I don't want to lie they teach us I want to teach whereas am not at school	*Oomaggie Bayasi titsha*
72	S	Yah you don't have to be physically here	
73	T	Yah that's what I want am interested in that in the tablet maybe am busy with something and absent to school but I can maybe record and do a video then send it to the learners.	
74	S	Okay.	
75	T	And the also another challenge we have about these tablets they don't have Bluetooth so it becomes difficult to send through (...) and some stuff maybe you want to send them classwork or some task	
76	S	Oh so every time you have to upload to the server	
77	T	Yes	
78	S	But what, okay besides the tablets what encourages you to use tablet in your classroom?	
79	T	Yah it's fun when you using the tablet learners enjoy even when you enter the classroom handling a tablet they become excited	
80	S	Oh okay	
81	T	Because they know that they will learn something new and they enjoy to see you that you are so innovative you can use tablets instead of books, and the use of revision question papers also help us because they are preloaded with the revision question papers you just tell them to click there and here	
82	S	/ okay	
83	T	But sometimes these kids they are so naughty because I told them you are not allowed when we use Mobi kits maybe you are not allowed to use tablet not unless the teacher has said so that take out your tablets we going to use this sometimes you'll find them when you are teaching you'll find the learners busy on their tablets you see?	
84	S	Yah, So sometimes they distract the class room.	
85	T	Yah sometimes	
86	S	Do you feel that the project really encourages teachers to take part in the training to take part in this whole tablet initiative do you feel that people are really motivated or encouraged to	
87	T	yes they are they are encouraged	
88	S	Is that only because when one teacher says or the other teacher is using a tablet now they also want to learn how to	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		use the tablet.	
89	T	If you saw somebody teaching using a tablet maybe using another technic maybe you have not really acquired the skill you ask that person to assist you how do you do this help me so we kind of helping each other.	
90	S	Okay, so before or when you compare yourself to the time you started using the tablets and now do you feel that your confidence has increase by using the tablets more or simply just because you went for the training or is it affecting them both	
91	T	I think it affect them both, I think it affect them both because before I got the training I was not confident to use the tablets I just kept them for status that I've got tablet you know.	
92	S	Okay so now I just want to ask generally are you the person who enjoys technology things, before you went for the training were you always curious about technology things or you never thought you would use them in your class?	*into ezinetechnology phakathi, ngento setechnology okanye bungasoze ucinge ba ungaze uzisebenzise eclassin yakho.*
93	T	No I never thought that I will use them in my class.	
94	S	Okay, So was there an interest even before you went for training for you want to try using them?	*Uye, uqondeba, uzisebenzisa*
95	T	Like things like tablet or any like laptop?	
96	S	Yes everything like ICT.	*kwanto nje kwa ICT*
97	T	I was interested on that, I was interested	*Bendinomdla bendinomdla*
100	S	You were interested, okay okay, so do you feel like maybe because you were interested it has affected your response to the training? Because there are some people who went to the training but they are not interested even though they went to the training.	*Ubunawo umdla, abanye abantu bebeyile ufumaniseke umntu akakho interested even ngoku ebeyile kwitraining*
101	T	Is it?	
102	S	Am not saying here in your school, but like generally I know even for us we maybe went to the training but you'll find that people were different in responding to what was trained	*Anditshi aphe sikolweni, nathi ufumaniseke abantu abekho...*
103	T	I don't know. I don't want to lie	
104	S	Okay.	
105	S	for the training were you as a teacher actually contribute to how the training should happen were you involved in saying we want to do this for the training?	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
106	T	Yah yah because Maggie will give us time to respond if we really enjoyed the training and she gave us time to give our inputs about the training and staff	
107	S	If you could change anything about the project what would you change	
108	T	Oh it's a difficult question [laughs] it needs a lot of thinking what would I change?	
109	S	Or what would you like to be different if you think back to your trainings, if you think back to now your lessons what would you like to happen differently.	
110	T	Mmm can you pass? [laughs]	
111	S	[laughs] do you feel that there are some people who felt a bit left out from the project especially when the project started at the school do you feel some schools felt like no not fair how come It did not start here or not?	
112	T	Yah yah let me make an example to start with an example when the tablet were first introduced to us we were a pilot school, we are pilot in the project, then there was a workshop then I took my tablet out I didn't take my policy document with me because the policy document is in the tablet it's loaded there then when I took out my tablet the facilitator said you must the page from your policy documents when I take out my tablet and paged the policy document the other teachers were offended because they asked why these people started with Arthur Mfebe? Because were the best school especially St James we are the best school in the area then I told them we are in the rural area we are disadvantage we don't have the ICT labs we don't have computer labs so I told them they were so offended.	
113	S	St James the one here in Cofimvaba	*apheCofimvaba*
114	T	In town yes.	*Etown ewe*
115	S	Oh okay	
116	T	Because each and everything that comes are sponsored to them, because they produce top learners whereas they screen when they select learners they screen, they are not like us, they don't as we do, like us we take every child that didn't get a school they screen, that's why they get the best learner it's not that they are above us in terms of teaching no.	*Ezifikayo apha zisisponsoriwha kuphiwa bona, xabethatha bona iselection yabantwana, like intoba sithathe wonke ummtana ongafumenanga sikolo, bona baya screener.*
117	S	You've answered... Oh I just want to ask do you feel like your teaching strategies have changed ever since you used the tablet.	Buswowundiphendule... iteaching strategies zakho zitshintshile

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
			eversince usebenzise itablat?
118	T	Yes they have changed, they have changed a bit because at first my approach was teacher centred other than learner centred but now it's both sides it's a two way its learner centred and teacher centred.	*ewe*
119	S	So normally how would you use your tablets, poetry? When they do the poem set work?	*xabesenza*
120	T	poetry	
121	S	Do you feel that you can still use your tablet if the content even if for example the curriculum changes or your needs for your lesson changes can you still continue?	
122	T	Yes I can still continue using my tablet	
123	S	okay	
124	T	Because I will only change... if the content has changes I will use the better approach will be the same maybe I will use the better approach I will just... you see	*yabo*
125	S	Okay, So Ma'am what did you find helpful in the training that you feel like it really impacted you using the tablets	
126	T	It's flipped classrooms, it's flipped classrooms	*Ziflipped classrooms zifliipped classrooms*
127	S	Is there one you said you wanted to use?	*Yilenubusithi ufunuyisebenzisa nhe?*
128	T	Yes it was interesting because Maggie they trained us on how to do flipped classroom but now since... sometimes some things it's just a skill if you using a computer or whatever gadget it's a skill if you have not used it for some time you just turn to forget it	
129	S	Yah yah, okay... ~	
130	S	Since the project started what has been for you the biggest change in this school what did you see that changed the most for you personally? since	
131	T	Generally	
132	S	Yes just generally	
133	T	Oh the number of... the enrolment has changed because learners we used to usually have few learners at the school in our enrolment but now it has changed because learners since we were the first school to get tablets learner flopped like we shifted about 19..learners now we are 405.	*Kwi enrolment yethu*
134	S	But now isn't that a lot for each teacher the amount of students you have?	
135	T	It affects us because we don't have many teachers here we are short staffed we are not many.	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
136	S	Then the increasing enrolment has made the shortage in textbooks and the shortage in everything else.	*Yenze ba kushote itextbook kushote*
137	T	Yes but especially with lower grades, grade 8 and 9 and 10 sometimes teachers who teach those grades they experience difficulties because they have yet given them tablets those grades because the number of tablets is limited so it becomes a problem.	*Abantu abatitsha pha*
138	S	Oh okay	
139	T	Otherwise grade11s and 12 we don't have a problem because they just take if they don't have a book or is left at home they just take a picture of that portion you are teaching and then...	
140	S	Okay they carry on... okay, since the training do you feel like the training has equipped you enough to go look for other ICTs or you, you go out of your way to look for content? Does the training encourages you to do that?	*Ukhangeklee ezinye iICTs okanye wena. Itraining iyaku encourager ukuba?*
141	T	I do hear your question then am trying to think, to look for another content, yah sometimes since I have already indicated that to us teachers of languages not everything loaded.	*Thina bantu belanguages*
142	S	Just from your own experience do you feel like this project will still continue in the next 3- 4 years?	
143	T	Yes it will still continue even the parents and the community is also interested somebody once said to me it will be wise if these people had started with them to train them	
144	S	Oh the parents	
145	T	So that the parents or to have the computer lab where on weekends they will be taught computers as a skill even the society people they are interested.	
146	S	So you don't have a local computer training centre here?	
147	T	No	*Ha a*
148	S	So society people do they also want to learn on how to use tablets and computers.	*Abantu, besociety Nabo bayafunu funda, necomputere*
149	T	Yes they are interested they are interested because we've got some learners who were studying here, who were schooling here, and then they dropped out from school because some reasons like social problems so they are interested one of them even indicated to me that I want to come back I wish I could come back and study again because in our time there were no gadgets.	
150	S	Am just going back to my question about change, anything if you could change anything about the project what would you like a change, if you had the money the resource the people everything there for you what would you change or what would you like to be done differently so for example you said	

Turn	T	Utterance	
		English only [Translations from isiXhosa in red]	**Original isiXhosa utterances**
		that you feel there's not enough content for the languages	
151	T	Yah that's the only change, that's the only change	
152	S	I want your information.	*Mna maam endicelaiinformation yakho*
153	T	My surname is Sam you have already written it	
154	S	Okay, and then your name	*Ndibhale name igamalakho?*
155	T	Nomthandazo	
156	S	Okay, and the number of years of teaching	
157	T	Am not permanent here am just an SGB teacher after am coming from the SAPS I've got few experience here 5years	*apha*
158	S	5years is a lot, so you're an SGB teacher	*Yhuuu incinci I 5 years*
159	T	Yes I am an SGB teacher	
160	S	And you're teaching Xhosa	*Utitsha isixhosa*
161	T	yes	
163	S	Is there anything else	
163	T	Are you going to need my back round?	*Uzawufuna nebackround*
164	S	No, it's part of this ICT previous attenders. Oh you said you were working for the SAPS before?	*Ihambelana nalento yeprevious ICT attendant, oh busithi busebenzela I iSAPS before*
165	T	Yes, for 12 years	
166	S	Where here?	*Phi apha*
167	T	East London am from east London.	
168	S	And then you ended up in Komani?	*Waza ekomani? Waenda apha ekomani*
169	T	Somebody told somebody I know from my sisters family told me there is a post here am I still interested in teaching then I said yes because I was pursuing my other career and I was doing social work.	
170	S	You were not sure, but East London is not that far how has been Komani?	*bungaqinisekanga Kunjani ke ekomani?*
171	T	I always spend my weekends at home because my husband and kids are there.	

Siyakhula Living Lab Narrative Samples

Ngwane

Learner A:

SLL has brought us technology, which has opened our minds. It has made it easy for us to communicate with people from far places like overseas. Children from my school have been able to get information and knowledge of being able to communicate with people from overseas and knowing what is happening around the world especially weather forecast, sport, news and stock exchange. It has helped me to know how to type and also search what is happening around the world. All that now, is a click away from my computer.

SLL has also helped my community as well. People from my community know how to sell their hand made stuff using technology. They can sell hide skins from the wild animals like monkeys, as well as beadwork, and handmade tradition calabash and our traditional musical instruments like harp, handmade guitar, arcodian and the gramophones, and the wood carved stuff. Although, the hopes of the elders to study are too short, because they are mostly old.

SLL has developed my community especially my school, because of Siyakhula my school is well known even our neighbouring schools bring their teachers and children to suck knowledge from Ngwane J.S.S.

Learner B:

SLL was established in the year 2010, where our parents were informed that there would be a computer lab in our school which will help us to learn more about computers. In the year 2011, teachers from Fort Hare, brought us SLL. That was when our teachers and community at large got the opportunity to learn about it (Computers).

It has been very nice at our school ever since SLL came over to our shores, because it has brought us a lot to our school and we are still learning, even today and we (pupils) are benefitting from it and even if we are in need of something we always get it on the computer. The computers bring us technology, pupils from Ngwane School can also type on it, because they are now computer literate.

ICT4RD Narrative Sample 05 March 2015

Grade 12a

The use of tablets at our school has helped us a lot. It is making the process of learning and teaching very easy, because we don't have much textbook here at school. And some textbook are there in the tablet. We can download previous question papers to help us when we are revising.

I advise the ICT4RED team to try and put a simcard slots in the devices because we are not able to connect to the Internet at home. If it had a sim card slot we could use it everywhere we are. Now we can only use it only here at school because of network errors. because of the networks errors. I am grateful to the team for what they are doing for us they are helping us a lot. I hope they can continue helping the people who are in need. I also would like to ask if they can do something so that we can be able to have an access in the Internet, if they can do that.....

Reflections-ICT4RED trip 21 Feb 2015

Today we went to Queenstown for the ICT4RED final training session that took place. It was the final phase of the project taking place and the final training so all stakeholders where invited to attend. However seems like only the DoE was present and members from CSIR team. It was great to experience the training one more time and also talk to people who were there and create contacts. After this session they only have one more session for reflections etc. At this stage the project is being completely handed over to the DoE and the schools themselves. As from March the CSIR steps down from the project. From the very onset they had planned when they would hand over the project so they have been working with that in mind. Once the project is completely handed over to DoE then there will be some minor support such as content support will continue to take place for another year, the monitoring and evaluation team will also continue for another year. It was interesting to note that infrastructure was not going to continue which will be interesting. From the session the following stood out:

- Most of the facilitators are people (teachers, subject advisors) from previous training sessions. So they have attended workshops on how to facilitate and have a sense of ownership of the project. So each school selected a representative (almost like SLL were each school nominates a representative to be trained who in turn should go back to their schools and train others as well) who attended the facilitation sessions and in turn assist Maggie with facilitating workshops. From the one facilitator she really demonstrated that she captured and understood the content being taught and was able to transfer that knowledge and also challenge the other teachers to truly apply that which they have learned across the modules. IT was interesting to see that these facilitators where really enthusiastic about the whole facilitation process and where able to share in their experience. It gave the course more authenticity and shows that one of their own is actually making use of these strategies and is able to demonstrate how they have made use of them. She was able to give practical examples (even small/minor changes that they could apply initially and see how it works and make changes and work in that process). So it's the train the trainer concept being applied which I feel works out well.
- Those who are enthusiastic and excited seemed more eager to learn and really learn how to apply what was taught. Whereas somewhere tired and seemed bored and not interested and seemed lost during the sessions as well. Shows that peoples attitude also affect their level of understanding that is achieved during the training.
- People really seemed lost when it came to trying to now transfer what was taught to their own personal context. That is "how do we apply the scavenger hunt lessons to our own subject and how our classroom setting. So as much as it was fun and they could do the activities during

the training they found it hard to now apply it despite being given examples by the facilitator etc. However, for a few they were encouraged by the facilitator to start small and she gave small examples.

- Teachers really found it easier when facilitators explained the work in xhosa rather than English, they were able to express themselves more and engage in conversation. Also they seemed to engage and challenge each other more when they worked in groups and where encouraged to debate. This seemed to create more hype and it was fun.
- The one facilitator mentioned that she has a class of 50 students but the whole school has 15 tablets so they have to figure out how to rotate and share them. At times they would have 4-5 learners on one tablet and she found that 1-2 learners ill dominate and understand while there will be 1 who is either shy or gets "swallowed in the crowd" so it is not easy to identify whether all the learners have truly understood. This is a problem and would be nice if the school had more tablets so that each learner gets more exposure and can practice as well. She also indicated that there is no set tool to measure progress or determine how far the learners have come. She indicates that it would be nice if there was a metric or a tool to use to see how learners are actually doing so that they know whether they doing well or not doing well and need more help. This really shows how my research is important but how can it be taken to an even more local level where the teacher can take it and use it just for they own classroom setting.-maybe provide guidelines on how to use it and modify it to an even more micro level.
- After the formal training has taken place the teachers are left on their own to continue figuring things out-so there is almost no formal follow up support and it would be nice to have that or more training sessions. There are 10 more circuit of schools that need to be trained which is a lot for DoE. They will need more facilitators to do that and it was suggested that it would be nice to have Maggie train more facilitators to assist however there is no funding. DoE does not have the funding to fulfil this as facilitators will also have to be paid. The one facilitator indicated that they created a whatsapp group whereby they added the teachers that where being training and they communicate and chat to help each other solve other problems they may have. For example one could ask how to apply something their class etc so its almost as if it's an opportunity where they "create" their own content and learn from each other as well.
- The twitter feeds on the ICT4RED blog should be looked at as many teachers use it as a platform to honestly express themselves about the project and their progress and experiences. So an opportunity to get feedback to add value to my impact assessment. Also their own memoire on their tablets would come in handy. These memoires are an opportunity for them to reflect after each module done etc. So again another opportunity for learning as well..