

The complexities of establishing causality between an ICT intervention and changes in quality-of-life: the case of CLIQ in four poorer communities in South Africa

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Abstract

Although a common means of local delivery of ICTs to the public is through telecenters, research on the success of this strategy is inconclusive. This paper is based on the experience and findings of a two-year ICT intervention, which provided free computer training and use to a group of 162 participants (through their local telecentre) in four poorer communities in South Africa, using a participatory methodology. With an attrition rate of 30%, impact analysis was done on 113 participants. The focus of this paper is twofold, namely to show the incidence and nature of change in participants' quality-of-life; and to present a logic model as the emergent theory behind the complex intervention. We conclude that a positive impact was achieved but that this was a result not only of the provision of computer training and access, but also of the way in which it was delivered – in particular the design and spirit of data collection, as espoused in the principles of participatory methodologies. We also suggest that for a positive effect, the intervention needs to reach a particular level of intensity, or 'tipping point'.

Introduction

Although Information and Communication Technologies (ICTs) have been shown to promote economic growth, the linkages between ICTs and the promotion of individual or community quality-of-life remain uncertain. More specifically, although a common means of local delivery of ICTs to the public is through telecenters¹, research on the success of this

¹Coward (2008:1) refers to Toyanna and Kenniston's definition of telecentres as the most succinct, namely: "Telecentres are those entities which exist primarily to provide the general public access to computing and/or the internet with the explicit intent to serve a development purpose".

strategy is inconclusive. This is largely due to differing definitions of what constitutes a telecentre and how telecentre success should be measured, in terms of goals and standards (Coward, 2008).

Using four case studies from the province of KwaZulu-Natal (South Africa) this project aimed to provide insight into the linkages between quality-of-life and ICT use at state-sponsored telecentres at an individual level, using a participatory methodology. The overall goal of CLIQ (*Community-based Learning, ICTs and Quality-of-life: A participatory approach to assessing the impact of ICT access on quality-of-life in KwaZulu-Natal*) was to conclude whether or not access to ICTs (in particular computers) after needs-based training, can improve the quality-of-life of poorer people as defined by them². The specific objectives were to a) assist participants to improve the lives; b) build the capacity of participating telecentre staff; and c) research the changes in participants lives, all with respect to the provision of free computer training and use to participants.

The focus of this paper is twofold, firstly it shows the incidence and nature of change in participants' quality-of-life from the perspective of the impact of their participation in the project; and secondly it presents a causal logic model as the emergent theory behind the intervention.

Initially, the theoretical underpinnings of the paper in terms programme theory and quality-of-life are addressed, as well as the context of the research. The research process is then briefly presented along with variables for the analysis of some findings. Through analysing the varied experiences of participants over two years, the paper goes on to show how with 'good' participation from individuals and more 'successful' project implementation, quality-of-life is likely to improve beyond that which might have occurred in the absence of the intervention. Some examples are provided of the various impacts and resultant change in quality-of-life. We conclude that a positive impact was achieved but that this was a result

² CLIQ was implemented by institutions names removed. Key research partners were the Universal Service Access Agency of South Africa (USAASA) - a unit within the National Department of Communications (South Africa) which funds telecentres in under-served communities) and the staff of telecentres participating in the project.

not only of the provision of computer training and access, but also of the way in which it was delivered – in particular the design and spirit of data collection, as espoused in the principles of participatory methodologies.

The names of the research areas have been changed, to protect the identity of the participants and other local stakeholders involved in the research process. An alias was also assigned to each participant. The first letter of the alias used indicates the area that the participant is from, as detailed in Error: Reference source not found. The alpha-numeric code after the name refers to their gender (F = female and M = male) and their age at the start of the project. So for example, **MusaM34** is a 34 year old male from eMpumalanga.

The reader should take caution when reading numerical tables, as sub-sample sizes are often below 50 people. The data is presented in percentage form to allow for easier comparison across sub-sample of different sizes, however statistical significance testing on differences has not been done.

Due to unanticipated problems with functionality at telecentres, CLIQ engagement with telecentre management was more extensive than anticipated. This provided a needs-based hands-on opportunity for telecentre-specific capacity building which resulted in an unexpected set of research findings. A separate paper entitled, *Telecentres and poor communities in South Africa: What have we learnt? (Names removed)* covers these issues. This paper does not detail the extensive participatory research process (with area-specific adaptations) nor the outcomes of capacity building activities. Four separate area focussed reports cover these issues³.

On Programme Theory and Quality-of-life

Recent research has indicated that ICT use has the potential to allow those with poor quality-of-life to improve their lives (and that with the collapse of the digital divide will come a reduction in the current disparity between those with wealth and those in poverty) (Kenny, 2002). Attempting to research if and how quality-of-life changes due to ICT use is tricky, not

³Refer to “CLIQ area report for eNingizimu: community based learning, ICTs and quality-of-life in a peri-urban area, Removed (2011)” and three other reports for the remaining three areas, with a similar title.

least because “ICT use” is a very broad term (even if confined to the newer technologies), and because there is no common definition of quality-of-life or agreement on how it should be measured (Costanza, et.al., 2008). Rather, quality-of-life is generally recognised to be a complex multi-faceted construct (Diener and Suh, 1997: 214). Some headway can be made by using a structured intervention, that supports specific increased ICT usage and involving those that engage in the intervention in defining and measuring changes in their quality-of-life.

Programme theory and logic models provide a mechanism by which interventions aimed at change, can be understood. Frechtling (2007) defines programme theory as *“A tool that describes the theory of change underlying an intervention, product or policy. It characterizes a project through a system of elements that include components and connections, with context being an important qualification”* (as cited in Torvatn, 2008). However, Rogers notes that, *“Life is not simple, but many of the logic models used in programme theory evaluation are”* (2008: 29).

With reference to health care reform, Glouberman and Zimmerman (2002) distinguish between problems that are simple, complicated and complex, with the frequently cited examples of baking a cake, sending a rocket to the moon and raising a child. To solve simple problems, a standard procedure is followed, resulting in uniform outcomes, while for complicated problems, more than one procedure or method is required as well as a variety of expertise, to create an outcome that can be predicted to a high degree of certainty. A complex problem can use procedures and expertise, but because the problem is unique, *“uncertainty of outcome remains”* (Glouberman and Zimmerman, 2002: 2).

Interventions themselves are rarely simple, addressing complex problems across different contexts with multiple procedures, variable sequencing and differing intensities or dosages of the intervention. As a result, simple linear models or causal diagrams cannot be used to describe complex interventions, as these often have many, sometimes conflicting goals and many stakeholders often with different priorities, in an environment that cannot be controlled. The challenge is to provide a model that links the inputs of an intervention (that addresses it's complexity); the environment which impacts on it; and the activity or

behaviour of the people linked to the intervention. Based on extensive secondary research, Rogers (2008) discusses aspects of complicated and complex programmes when trying to explain the inherent logic in a programme through a logic model. Interventions are referred to as complicated when there are many groups or organisations involved or when there are many sites of implementation, in addition to multiple or alternate causal chains linking inputs and outcomes, that can occur simultaneously within the same intervention.

Rogers (2008) notes that complex interventions can be explained by logic models showing recursive causality where there is more than 'one pass' through the intervention or through parts of the intervention i.e. where the causal chain contains feedback loops or reinforcing loops. 'Emergence' and 'tipping points' are also features in some complex interventions. 'Tipping points' are present in interventions "*where a small additional effort can have a disproportionately large effect*", while emergence is when "*specific outcomes, and the means to achieve them emerge during the implementation of an intervention*" as the "*path to success is so variable that it cannot be articulated in advance*" (Rogers, 2008: 39 & 31). This would be true of broadly defined interventions with multiple stakeholders, multiple goals and varying environments that target change simultaneously at many levels.

Kubisch et. al. (1995: 1) described comprehensive community initiatives (CCIs) as a varied range of initiatives that have a common goal of "*promoting positive change in individual, family and community circumstances in disadvantaged neighbourhoods by improving physical, economic and community circumstances.*" They list six features of CCIs that make them difficult to evaluate, namely "*horizontal complexity, vertical complexity, the importance of context, the flexible and evolving nature of the interventions, the breadth of the range of outcomes being pursued, and the absence of appropriate control groups for comparison purposes.*" (Kubisch et. al, 1995: 3). In reference to CCIs as examples of emergent interventions, Rogers (2008) argues that a logic model can be developed to explain how a complex intervention works - which can change as the intervention and the understanding thereof changes - and presents a range of different types of logic models that are applicable to emergent interventions. In line with this, we have developed a logic model, induced from the findings of CLIQ.

CLIQ as an Emergent and Complex Intervention

While the CLIQ intervention was mainly focussed at individual and not community level, it has a number of similarities with CCIs as described by Kubisch (1995). Firstly, a key concept in CLIQ, quality-of-life, does not have a clear definition or commonly accepted way of measuring it (Costanza, 2008). Secondly, while CLIQ was not initially designed to evolve over time, as it became evident that design changes were necessary, we incorporated these into the research design - this is part of the nature of emergent interventions. Thirdly, a number environmental factors over which CLIQ had no control, had a direct impact on the nature and success of the intervention, also a common factor found in CCIs. In addition, how and why ICT impacts upon quality-of-life has yet to be fully theorised due to the recent nature of the entire field of ICT for development.

In the initial design of CLIQ, the definition of quality-of-life broadly and more specifically the basis on which participants might conclude improved quality-of-life, was not defined by the research team. Rather, we expected that the participants would define and conclude on any changes in quality-of-life (referred to by some as subjective well-being). We also anticipated that participants would make use of the intervention in a variety of ways to improve their quality-of-life. Common examples used in initial stages of the project was that if someone was happier after the intervention either because they played games on computers, or met someone during activities with whom they formed a relationship, or found a job through the internet, all would be recognised as an improvement of quality-of-life. This links both to the alternate causal paths and emergent outcomes referred to by Rogers (2008) as a feature of complex interventions.

From the analysis of CLIQ findings, simultaneous and recursive causal strands were identified as different participants engaged with the intervention in different ways, resulting in a range of unique outcomes. This "*what works for whom and in what ways*" notion of realist evaluation (from Pawson and Tilley, 1997, cited in Rogers, 2008: 37) matches with the underlying concept in Sen's (1999) "Development as Freedom", that development or progress means that a person can develop their own life or improve their quality-of-life in ways that are important for them, and not have to pick from externally determined or sanctioned options of what improved quality-of-life is. In the initial stages of the project,

fieldworkers stressed that CLIQ would not directly improve participants' lives, but that they had to work with and use the CLIQ opportunity to improve their own lives. This is in line with Sen's (1999: 144) assertion that "*The creation of social opportunities makes a direct contribution to the expansion of human capabilities and the quality of life*".

A Participatory Approach

Participatory methodologies (PMs) are particularly suited to research the impact of ICTs on quality-of-life as these are flexible and evolve in relation to their context. Participatory research⁴ can accommodate differing research environments and allows accordingly for local changes in the research process (White and Pettit, 2004). PMs include participation and action on the part of participants, researchers and other stakeholders as integral to the research process, analysis and findings. PMs are also suited to development and research activity concerned with concepts that do not have a clear or similar definition in different contexts. With particular reference to local definitions of well-being or quality-of-life, White and Pettit (2004: 6) state that "*the people living within a situation could plausibly be expected to have a better understanding of the many issues facing them than outside experts.*"

The use of participatory research focussing on well-being (or quality-of-life) is supported by White and Pettit's review, stating that "*Participatory methods have thus contributed to the much wider recognition of contextual, subjective and non-material dimensions of human experience, and the complex dynamics and causalities behind poverty and well-being*" (White and Pettit, 2004: 7). Participatory research is particularly appropriate to use with complex or emerging interventions, as both have processes that are flexible and which evolve over time - an attribute which also makes such interventions difficult to evaluate (Kubisch et. al., 1995).

Research Design

⁴Participatory research, along with numerous others like participatory learning and action, participant-led evaluation, and so on are part of a broad family of participatory methodologies (Chambers, 2008).

Four research sites were chosen in which there were operational telecentres⁵ containing at least 10 computers connected to the internet. The research sites chosen were: eNyakatho, an urban township near Durban; eNingizimu, a peri-urban area near Amanzimtoti on the KZN south coast; eMpumalanga, a rural area near Mangusi in the KZN northern coastal area; and eNtshonalanga, a rural area near Richmond, inland of Durban.

Table : Description of Research Sites

Manje Sites	Maduzane sites	
eMpumalanga	eNingizimu	eNyakatho
a sparsely populated rural area (pop. 2020) 6 hours drive from Durban and 30 minutes drive away from a local town (pop. 6560) close to a national border.	a peri-urban area (pop. 1865) about 40 minutes drive from Durban (pop. 3.6mil) and about 10 minutes drive from an urban town centre (pop. 22575)	a densely populated urban 'township' (pop. 31786) about 30 minutes drive from Durban.

In an attempt to isolate changes in participants' quality-of-life that were due to the ICT intervention, as opposed to changes that may have occurred over time regardless of the intervention, a staggered approach to the introduction of the intervention across the four areas was adopted when designing the intervention. By random assignment, eMpumalanga (rural) and eNingizimu (peri-urban) were designated as Manje (meaning 'now' in isiZulu) sites, where computer training activity and participants' use of free hours would commence approximately six months earlier than in the designated Maduzane (meaning 'later' in isiZulu) sites of eNtshonalanga (rural) and eNyakatho (urban). This was to facilitate identification of changes in participants' quality-of-life that occurred due to the intervention (as opposed to changes that would probably have occurred due to the normal course of life). However due mainly to problems with telecentre functionality across the sites, the implementation of this approach proved problematic. Instead a continuum of

⁵Or telecentres that were considered by the USAASA provincial office as 'soon-to-be functional'

treatment resulted from the implementation of CLIQ, ranging in intensity, with eMpumalanga experiencing the highest intensity of the intervention and eNsthalanga the lowest, as will be shown later on. This can be thought of as varying 'dosages' of the ICT intervention.

In each of the study areas, action and research orientated fieldwork activities comprised of four stages. The first stage entailed the identification and recruitment of interested participants, in partnership with the staff of the four participating USAASA telecentres. The desired sample was a total of 120 participants across the four research sites, using a quota sampling approach which aimed at an equal split of participants across gender and between the following occupation groups: community activists, self-employed people, and unemployed youth⁶. From the 227 people who attended the first project activity across the four areas to find out what the project was about, 148 were selected as participants, and together with the late acceptance of another 14 participants, resulted in a total selected sample of 162 participants.

The second stage involved initial quality-of-life and information and communication assessments which were undertaken using visual diagramming methods in groups, to identify local definitions of quality-of-life and participants' relative quality-of-life. Importantly, this stage also involved participants setting their own life goals, during individual interviews.

The third stage involved the development and provision of two computer training courses, together with the provision of 100 hours of free computer and internet access to participants at their local telecentre. The first training course focussed on computer basics, word processing and the use of internet and email. The second focussed on common life goals amongst participants, with a view to how the computer could assist in attaining those goals. In addition, this stage included a mid quality-of-life assessment after the first training course, both to monitor changes in quality-of-life and particularly to input into the content of the second computer training course.

⁶These 'occupation' categories defined by the research team were not useful in the analysis of results (as they did not match with participants' understanding) and were therefore not used.

The fourth and final stage focussed on participants' stated changes in quality-of-life over the two years of fieldwork, as well as the use and impact of ICT access, and the impact of the project as a whole. Information was gathered mainly through intensive individual in-depth interviews.

Challenges experienced during the research that impacted on the implementation of the methodology included trade-offs between the sometimes conflicting project goals of research and improvement in participants' quality-of-life; communication with and location of participants; varying capacity and motivation of different participating telecentre managers and facilitators; low or non-functionality of telecentres; sustaining commitment and interest from participants; and time demands on participants.

The CLIQ Sample

Analysis of quality-of-life change was possible for those participants who attended at least two assessments, (as each assessment collected data on their perceived quality-of-life and changes in quality-of-life), but not necessarily any training sessions, as well as those who only attended the final assessment. Across the four areas, 113 participants fitted these criteria, hereafter referred to as the *impact sample*, resulting in an overall attrition rate of 30%.

The urban areas experienced higher attrition (41% and 39%) than the rural areas (30% and 11%). While factors other than the nature of the area had an influence on the attrition rate, the area difference does provide some indication that the urban environment impacts more negatively on medium term project participation (two years) than rural environments. The in-depth interviews from rural areas indicated that there were fewer competing opportunities regarding training, education and jobs, which is probably one reason for the lower attrition.

Variables explored during the analysis of the data were sex, age, area and the urban /rural divide. Additional key variables for analysis emerged from the research process namely individual levels of participation and the relative success of implementation of CLIQ at an area level. In addition to these, whether or not people's quality-of-life improved is a finding

as well as an analysis variable. Below, characteristics of the impact sample are presented in terms of these analysis variables.

Age and Gender

Overall more women than men were interested in the CLIQ project, based on those that attended CLIQ's initial questionnaire day. While the aim was to get an equal gender split per area, this was only possible in eMpumalanga and eNyakatho. In eNingizimu, three quarters of the sample (74%) were women and in eNtshonalanga four fifths of the sample (79%), were women. Overall, two thirds of both the selected sample and the impact sample were women, indicating no gender difference regarding attrition, which held across all areas.

The selection criteria did impact on the sample in terms of age, as the target that a third of participants should be unemployed youth aged up to 24 years, skewed the sample towards the youth. The average age of participants was 27 years, with ages ranging from 17 to 64 years. Just over half the total sample (55%), was aged up to 24 years - eNingizimu displays a different pattern, with the average age being 35 years and only 25% aged 24 years or less - the average age for the other three areas was between 24 and 27 years, with over half of participants aged 24 years or less.

Level of Individual Participation

Based on attendance data per participant from assessments and computer training sessions, the level of individual participation of those included in the impact sample has been classified as either good, average or poor, as defined in Table . This classification is used as an analysis variable to investigate links between the nature of attendance by individuals and the nature of their quality-of-life change.

Table : Individual participation across all activities by area

Nature of individual participation	All Areas	eMpumalanga	eNingizimu	eNyakatho	eNtshonalanga
Good	Attended all CLIQ activities or skipped only 1 activity	58%	73%	50%	52%

Average	Skipped more than 1 activity but did attend some training	19%	21%	45%	22%
Poor	Did not attend any training	22%	6%	5%	26%
Impact sample	113	33	20	23	37
Individual participation-based area ranking (where 1 = best and 4 = worst)			1st	2nd	3rd

Considering attendance at all activities on an individual basis, participation by three fifths of the sample was good, with one fifth displaying average participation and another fifth displaying poor participation. When looking at the areas, eMpumalanga stands out with almost three quarters of participants falling in the good participation group, whereas the proportion was around half for the other areas. However, in eNingizimu, the proportion of participants with poor participation was lower than eNtshonalanga and eNyakatho, and about the same as eMpumalanga. eNtshonalanga displays the worst scenario with poor participation at 43% (followed by eNyakatho at 22%). Based on individual participation, the four areas can be ranked from the best (eMpumalanga) to the worst (eNtshonalanga) as shown in Table . The level of individual participation was influenced by a range of individual and environmental factors⁷, and can be used as a proxy for the intensity (or dosage) of the intervention in the area.

Evaluation of Implementation

As the project set out to examine whether or not quality-of-life improves with access to free computer training and computer use, it is important to consider at an area level, the extent to which the project was able to effectively deliver computer training and to facilitate, through the local telecentre, participants' use of their allocated 100 free computer hours (paid for by CLIQ).

The project was implemented to varying degrees of intensity in the four areas, due to a range of issues, including the non-functionality of computers; theft of computers; damage to buildings housing computers; uncooperative telecentre facilitators; scheduling difficulties

⁷These facilitating and hindering factors (both individual and area specific) are noted in the latter part of the paper.

with computer trainers; and electricity cuts. To get an overall classification on the success of implementation (based on the supply side), Table provides some qualitative measures from the implementation process, against which to view the participation numbers discussed above.

Table : Indicators of success of CLIQ implementation

Process indicator	eMpumalan ga	eNingizim u	eNyakatho	eNtshonalang a
a. Months between initial assessment and phase 1 training	Good	Problematic	Problematic	Problematic
b. Months between phase 1 and phase 2 training	Acceptable	Good	Acceptable	Problematic
c. Months between phase 2 training and final assessment	Acceptable	Good	Problematic	Problematic:
d. Access to free computer hours at local telecentre	Good	Acceptable	Problematic	Problematic
e. TC facilitator on hand and generally willing to help participants	Good	Problematic	Problematic	Problematic
f. Relationship between fieldworkers and participants	Good	Acceptable	Acceptable	Acceptable
Implementation based area ranking (where 1 = best and 4 = Worst)	1 st	2 nd	3 rd	4 th

Where computer training was delayed, this often affected the project negatively. Participants either lost interest in the project, changed their mobile phone number (meaning they could not be contacted), or forgot what they had learned in the previous computer training. This resulted in attrition or in less effective computer learning and use.

Rows a, b and c in Table , show that overall, eMpumalanga enjoyed the best process in terms of timing, followed by eNingizimu and then eNyakatho, with the eNtshonalanga process being the worst affected by delays in project activities. Access to the telecentre to use free hours and assistance from the TC facilitator followed the same pattern with eMpumalanga being the best and eNtshonalanga being the worst. This implementation ranking is another proxy for the intensity of the intervention.

With many activities making up the intervention and with many possible variations in terms of individual participation in these activities, it is useful to cross-check the effectiveness of the delivery of the intervention, as delivery and participation are critical features to bear in mind when analysing the impact on participation. Table provides quantitative information on numbers of participants per

area that participated in various key project activities, confirming the participation and implementation rankings noted above.

Table : Participation in project activities per activity

Project numbers and indicators	All Areas	eMpuma- langa	eNingi-zimu	eNya- katho	eNtshona- langa	
1. Number of participants selected (Selected Sample)	162	37	34	38	53	
2. Sample for impact analysis (Impact Sample)	113	33	20	23	37	
3. Impact sample as percentage of selected sample	70%	89%	59%	61%	70%	
4. proportion of selected sample that received some computer training	57%	86%	62%	45%	42%	
5. proportion of impact sample that received some computer training	78%	94%	95%	74%	57%	
6. proportion of impact sample at final assessment	78%	88%	85%	83%	62%	
Activity based area ranking (where 1 = best and 4 = worst)			1st	2nd	3rd	4th

Importantly it shows that while over four fifths of participants from eNingizimu, eNyakatho and eMpumalanga in the impact sample did attend the final assessment, this proportion drops to 62% for eNtshonalanga (see **Table** , row 6). Considering the proportion of participants that received

computer training (see rows 4 and 5), again eMpumalanga emerges as the best area regarding attendance at computer training, followed by eNingizimu, eNyakatho and lastly, eNtshonalanga.

To sum up regarding implementation and participation levels, the research findings can be analysed using an “intensity (or dosage) of intervention” ranking, as follows: 1st eMpumalanga; 2nd eNingizimu; 3rd eNyakatho; and 4th eNtshonalanga.

Quality-of-life Change as Analysis Variable

Data gathered on changes in participants’ quality-of-life, a key finding in itself, is also used as an analysis variable. Broadly, two aspects of CLIQ had the potential to impact on the well-being of participants. These were the computer training and free use of computer hours; and the participatory process they engaged in, particularly the assessments, but including communications and interactions beyond the assessment activities. This refers to multiple causal strands in complex programme theory.

A critical feature of the research was to be able to distinguish between changes that would probably have occurred in participants’ lives regardless of CLIQ, from those that were influenced by the CLIQ project. When analysing the data post field, we applied six questions (shown in Error: Reference source not found) to establish perceived quality-of-life change and, separately, to understand the nature of CLIQ impact on each participant. This created three impact groups, namely: a) direct impact (CLIQ impact linked to at least one of participant’s reasons for quality-of-life change); b) indirect impact (CLIQ impact was not linked by the participant to any reason for quality-of-life change but was linked to participants’ definition of quality-of-life); and c) no or unclear CLIQ impact (where quality-of-life change was unrelated to CLIQ). The two quality-of-life change groups were: i) improved quality-of-life, and ii) unchanged or declined quality-of-life. Due to the broad nature of the local definitions of quality-of-life, none of the reasons for quality-of-life change fell outside of the community definition (discussed below). The number of participants falling into the different impact and quality-of-life change groups (resulting from the application of these six questions) is shown in Table .

Local Definitions of Quality-of-life

Participants shared their views on what constitutes good and poor quality-of-life during the initial assessment (in occupation based groups) and again individually, as part of their in-depth interview in the final assessment. The most common definitions of high and low quality-of-life related to clothing, education, food, housing, jobs or own businesses, family structure and networks, personal characteristics (including beliefs, behaviour and attitudes), and money; as well as the (in)ability of people to do things for themselves (dependency); and to afford the things that they want and need (affordability). Transport, health and services also featured within the definitions, although transport issues were used less often to describe people with low quality-of-life. Health was less likely to be used to describe those with high quality-of-life. Interestingly, the absence of water/electricity services was used as a descriptor for low quality-of-life in urban areas, while the presence of water/electricity services was used to describe high quality-of-life in the rural areas.

Changes in Quality-of-life and the Impact of CLIQ

Of the 113 participants, two out of every three reported an improvement in their quality-of-life between the first and final assessments (approximately two years) while one in three reported that their quality-of-life had declined or remained the same.

Table : Changes in quality-of-life

All Areas	eMpumalanga	eNingizimu	eNyakatho	eNtshonalanga		eMpumalanga
CLIQ Intensity/ Dosage	1 st	2 nd	3 rd	4 th		Non-participants
Improved QoL	66%	73%	75%	61%	59%	60%
Unchanged or Declined QoL	34%	25%	25%	39%	41%	40%
Impact Sample	113(100%)	33(29%)	20(18%)	23(20%)	37(33%)	

eNingizimu and eMpumalanga, with higher intensities of the intervention, recorded a higher proportion of participants with improved quality-of-life (around 75%), than the areas of eNyakatho and eNtshonalanga (around 60%). When considering quality-of-life changes amongst a group of non-selected people at eMpumalanga (who qualified to be part of the

project but were randomly excluded), the results are similar to that of eNtshonalanga and eNyakatho. This suggests that the higher dosage of CLIQ (better participation and more successful implementation) led to an increase in the number of people with a positive change in quality-of-life.

Table shows that overall, a third of participants noted an impact from CLIQ that directly contributed to one of their reasons for quality-of-life change. Another two fifths were also impacted on by CLIQ, and although they did not associate the impact with any of their reasons for quality-of-life change, the impacts did relate to issues included in the local definition of quality-of-life. The remaining 24% noted no impact from CLIQ or impact was unclear (often due to lack of information from those in the impact sample that did not attend the final assessment).

Table : Nature of CLIQ impact

Nature of CLIQ impact	All areas	eMpumalanga	eNingizimu	eNyakatho	eNtshonalanga
CLIQ Intensity/ Dosage	1st	2nd	3rd	4th	
Direct impact	35%	52%	45%	26%	19%
Indirect impact	42%	45%	35%	39%	43%
No/ unclear Impact	24%	3%	20%	35%	38%
Impact Sample	113(100%)	33(29%)	20(18%)	23(20%)	37(33%)

As with changes in quality-of-life, the nature of impact on participants follows the same pattern as the CLIQ intensity ranking when looking at those who reported a direct impact (52% in eMpumalanga, down to 19% in eNtshonalanga) and when looking at those who reported no impact (3% in eMpumalanga up to 38% in eNtshonalanga).

In many cases, quality-of-life change (or lack of change) was due to more than one reason, with different factors improving or lowering quality-of-life over a period of time and CLIQ being only one potential source of change. Table shows that those reporting that they had experienced no impact from CLIQ were less likely to report any improvement in their quality-of-life from any source, compared to those where CLIQ had made some impact. Three quarters (74%) of those noting no impact, experienced a decline or no change in their quality-of-life, while 30% of those noting an indirect impact on their lives, and only 10%

noting a direct impact on reasons for quality-of-life change, experienced a decline or no change in their quality-of-life

Table : Quality-of-life change by nature of CLIQ impact

Nature of CLIQ impact	Total	Direct impact	Indirect Impact	No/ unclear impact
Improved QoL	66%	90%	70%	26%
Unchanged or Declined QoL	34%	10%	30%	74%
Total Impact Sample	113(100%)	39(35%)	47(42%)	27(24%)

In the four cases where CLIQ impacted directly on a reason for quality-of-life change and the person's quality-of-life remained unchanged or declined, the impact from CLIQ was mostly positive. For example, SallyF24 got a job because of her new computer skills, but over the same period her father died. For Sally, having someone at home who supported her was part of her definition of a good quality-of-life, and so overall her quality-of-life declined. Although this cannot be verified, it would seem that Sally's quality-of-life overall was higher than it would have been without CLIQ, although it still showed a net decline. In most cases where CLIQ impacted on the lives of participants, this impact was positive, however some negative impacts were recorded⁸.

While Table considered quality-of-life change in relation to CLIQ dosage at an area level and Table shows quality-of-life change according to nature of impact on participants, Table shows individual participation by change in quality-of-life.

Table : Changes in quality-of-life by quality of individual participation

Nature of individual participation	Total	Improved Quality-of-life	Unchanged or Declined Quality-of-life
Good	58%	71%	34%
Average	19%	20%	18%
Poor	22%	9%	47%
Impact Sample	113(100%)	75(66%)	38(34%)

Those with improved quality-of-life, were more likely to have participated well in CLIQ (71%), than those with unchanged or declined quality-of-life (34%). Similarly, those with

⁸These are discussed in an upcoming CLIQ paper.

unchanged or declined quality-of-life were more likely to have participated poorly (47%), than those with improved quality-of-life (9%).

It is very difficult to attribute causality with regard to changes in quality-of-life because of the multitude of global, national local and individual factors that coalesce to produce change. As Ng'ambi and Brown (2004: 38) noted in their utilisation-focussed evaluation of ICT in education: "No single factor is a necessary and sufficient cause for any other factor". Therefore, it is important to consider the link between the intervention and subsequent change in quality-of-life from a number of angles, to triangulate the findings of this research. Table looks at the nature of CLIQ impact on participants according to the quality of their individual participation. Virtually all (97%) participants with good individual participation were impacted on directly or indirectly by the project. Three quarters of those who participated poorly (including non-attendance at computer training sessions) did not indicate any impact on their lives from CLIQ.

Table : Nature of Impact on participants by individual quality of participation

Nature of CLIQ impact	Total	Good participation	Average participation	Poor participation
Direct Impact	35%	48%	36%	0%
Indirect Impact	42%	48%	40%	24%
No impact	24%	3%	24%	76%
Impact Sample	113(100%)	64(58%)	25(19%)	25(22%)

To sum up regarding impact and changes in quality-of-life, more effective implementation of the intervention (one part of the dosage) leads to an increased proportion of participants with improved quality-of-life and to an increased proportion of participants linking the project impact to their reasons for quality-of-life change. Good participation (the other part of the dosage) is more likely to lead to a direct impact on reasons for quality-of-life change, which in turn is more likely to lead to an increase in quality-of-life. Error: Reference source not found illustrates these causal linkages visually, with reference to the data tables that support the linkages.

This suggests that with regard to process, there is a point on the continuum of intensity of the intervention (CLIQ dosage) beyond which participants' engagement in the process begins to have a positive affect that translates to an improvement in quality-of-life – described in relation to complex interventions as a 'tipping point'. But how and why does better participation in areas with relatively more successful project implementation lead to an increased likelihood of improved quality-of-life? Or put differently, what is the logic behind how the intervention worked?

Causality and a Logic Model

Inherent in the research goal of CLIQ is the question of causality. Initial stages of analysis were frustrating as with each new set of participants analysed, a different causality chain would emerge linking reasons for change. Similar outcomes were direct reasons for a change in quality-of-life for some participants, but not for others. Outcomes were not pre-determined but rather emerged from data analysis, through a coding process similar to grounded theory⁹. This method of data analysis is consistent with the concept of emergence in relation to complex programme theory, as well as with the principles of participatory research. With the huge variety of causal paths illustrated through different participants' experiences, attempts at a causality diagram linking outcomes always ended when the diagram could no longer accommodate yet another set of arrows linking factors

⁹In reference to grounded theory, Strauss and Corbin (1998:12) note that "Theory derived from data is more likely to resemble the 'reality' than is theory derived by putting together a series of concepts based on experience or solely through speculation."

already on the diagram. As Rogers (2008: 30) points out, attempts to explain the logic inherent in complex programmes “*do not involve creating messier logic models with everything connected to everything*”.

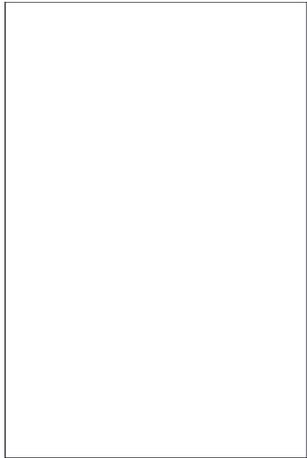
Two useful diagrams did nevertheless emerge from the analysis process. Firstly, using a pairwise¹⁰ comparison matrix from the set of PRA¹¹ methods, all direct causal linkages between outcomes can be shown¹². Secondly, a logic model was created based on factors hindering and facilitating participation in CLIQ, the engagement of participants with the intervention and observed outcomes (evident from group discussions and three individual interviews per participant over the two years) .

The logic model below (Box) shows recursive and multi-directional causal linkages between participants’ environment, the CLIQ process, participants’ steps to improve their quality-of-life, emergent project outcomes and quality-of-life change.

10A pairwise matrix is typically used to create a ranking of goods or issues in terms of a particular aspect.

11Participatory Rural Appraisal is a methodology often associated primarily (but incorrectly) with a large set of visual diagramming and analysis methods.

12This is not included in this paper as it is part of a forthcoming paper on the nature of outcomes and the multitude of different causal linkages between different outcomes.



E. Social norms and values

F. Telecentre functionality (TC facilitators, electricity, governance)

3. Learn to use computers
2. Meet, think, discuss, reflect, plan
1. Project participation

Notes on inhibitors,
facilitators and process:

- CLIQ process and steps to changed quality-of-life are impacted on by various facilitators and inhibitors
- CLIQ process defines steps 1 to 5, which are conducted together with participants and telecentre staff and is also changed in response to area-based realities.
- Facilitators and inhibitors are continually impacted on by outcomes and changes in quality-of-life (which in turn affects CLIQ process)

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Starting in the centre of the diagram Steps 1 to 5 reflect the different stages in the CLIQ research process, facilitated by CLIQ together with participants and telecentre staff. Steps 6 to 8 were dependant on participants' efforts and impacted on by the CLIQ process and the environmental factors. Participants moved up (and down) the steps as they engaged with the project and each other. The emergent outcomes (on the right side) are a summary of the factors that participants noted as having an effect on them, which either directly or indirectly led to a change in quality-of-life. This reflects the differences between individual quality-of-life definitions and therefore what was regarded (individually) as impacting on quality-of-life (as a similar outcome impacted differently on different people). Environmental factors A. to F. are the factors that emerged from analysing why CLIQ impacted differently on participants. These environmental facilitating and inhibiting factors not only impacted on participants' ability to participate in and make use of the CLIQ intervention, but also on the process and success of the CLIQ intervention at an area level. Participants usually entered the model at step 1 but exited the causal model at different stages, depending on their personal mix of factors A. to F. Over the two years participants' individual mix of A. to F. changed, either due to the normal course of life, due to their participation in CLIQ or in response to outcomes. While particular outcomes were more likely to be linked to particular steps (like empowerment with step 2), the outcomes are not shown separately or in relation to particular step, as linkages between steps and outcomes varied across participants.

Table shows that those receiving a lower dosage of the intervention (eNyakatho and eNtshonalanga participants) were just as likely to note improvements in quality of life, as the non-selected participants from eMpumalanga, but much less likely than those in the areas receiving a higher dosage (eMpumalanga and eNingizimu). This indicates a 'tipping point' attributed to some complex logic models beyond which participation in the intervention begins to yield results in terms of improved quality-of-life. On a continuum of intervention intensity, this point would be somewhere between eNingizimu and eNyakatho's level of intervention intensity.

With the Passing of Time

The impact on participants and on their quality-of-life must be seen in the context of time. Impact and people's perception of impact changes over time. SallyF34's quality-of-life declined because she lost her father during the fieldwork period, and despite acquiring a job

as supervisor at a car wash because she had computer skills. Her decline in quality-of-life was probably less than it would have been without her new computer skills which led to a better job than she was hoping for and, with time may lead to her analysis of an improvement in her quality-of-life, as she learns to cope with the pain of losing her father.

An unexpected research benefit of establishing good relations with participants was that some remained in contact with CLIQ after fieldwork had ended. During the final CLIQ assessment, BathaF21 reported that her quality-of-life went down during the fieldwork period because she had to return to living with her nuclear family, despite irreconcilable lifestyle differences. She felt that a positive impact of CLIQ was that she made good friends that were supportive of her. *“Most of the people I met here are still my friends and we groom each other to be great people”* (BathaF21, 2010). About a year after fieldwork had ended Batha contacted CLIQ via Facebook: *“Good news is your computer skills helped me a lot coz now I’m doing admin clerk training at circuit office. Even sometimes it hard you know but hey I’m getting there everyday.”* This resonates with White and Pettit’s statement that *“The ‘social life’ of any research project - its principles, conduct and relationships established with respondents - is in fact central not only to its mortality, but also to the quality of information it can yield”* (2004: 24).

MlamuliM28 posted a message to CLIQ on Facebook from his mobile phone, over a year after fieldwork was completed. *“Hi, i has been long time no chat, invitation to my wedding which will be at (eMpumalanga) telecentre on the 10/07/2010, i almost reach my goal cos i got job, house en wife, only car miss. nw en i’m looking 4ward in to it. Cliq participants are real progressing!!!”*. The impact of CLIQ on quality-of-life noted in this paper, must be seen as an interim impact which will change as time passes.

Nature of Improvement in Quality-of-life

The outcomes of participants’ engagement with CLIQ (listed in Box as “outcomes of intervention”) show the range of impacts, each supported by a unique story. NelliF37 grew in confidence in relating to others and changed her perception of her role as a mother, wife and daughter-in-law within the home. Her belief that a woman should stay at home and care for the family (in 2008) led her venture outside the home to learn skills to care for her ailing mother-in-law, which resulted in her becoming part of CLIQ. Through CLIQ she met

people who taught her mat-making skills and she began to use her cell phone more regularly, which increased her social connections with the world outside of her home.

While for Nelli, the empowering impact of CLIQ was mainly social and psychological, for MthembeniM28, it was mainly economical and in relation to business skills. Mthembeni's tiling business grew as a direct result of his application of what he learnt during CLIQ training. During the fieldwork period, he created marketing material on computer to advertise his business and communicated with customers over email. By the end of the two year fieldwork period, he had hired six workers, bought tiling equipment and no longer relied on personally approaching people purchasing tiles at tile shops for business.

Impact also extended beyond participants to others in the community. NkuluF24's catering business improved and she felt that *"the business is where it is now because of CLIQ"* (2010). In addition, through the internet, she found a training opportunity in Johannesburg. With the additional funds from her improved business, she funded the building of a house for herself and daughter (which her sister managed through mobile contact with Nkulu), while on the call centre course. Nkulu's increased quality-of-life therefore also impacted on her family and their experiences.

Through CLIQ, MbonaM22 found a passion for ICT's, clearly visible in his demeanour when discussing what he learnt from CLIQ. He had a brightness of spirit, new found confidence and changed sense-of-self in relation to the world (see Error: Reference source not found). Mbona's friends warned him that CLIQ was not a project aimed at helping him, however Mbona was so passionate about CLIQ that he typed many of his friends' hand-written CVs and gave it to them, effectively showing them that CLIQ did hold value. It is foreseeable that this may impact on the way future development-orientated projects would be engaged with, by members of the community.

Conclusion

The long term social, economic and developmental impact can never be precisely quantified. Neither can the chain of impact on participants and others be fully traced as

participants continue to live their lives, with CLIQ's impact on them merging with their other ongoing activities and life events, over time. However, our evidence suggests that this ICT intervention did contribute to the improvement in quality-of-life for many of the participants and did not lead to the decline in the quality-of-life for any of the participants. These improvements were varied in nature from economic, to social, educational, political and psychological.

Some participants' quality-of-life improved mainly due to their use of computers and application of other aspects of the training provided, which resulted in them getting a job or starting a small business. Others noted improved quality-of-life mainly to due to new friends and networks, the acquisition of knowledge and feelings of empowerment or self-confidence. In the latter case (in particular) it was the way the intervention was implemented and not the acquisition of computer skills or use of computers that increased quality-of-life. The process by which ICT use is learnt and the social relationship surrounding and resulting from this process, together with the context in which ICTs are subsequently used, is critically important to the adoption of ICTs by those in resource-poor communities.

Looking Forward

While CLIQ's previous paper¹³ supports the general finding of comprehensive reviews of telecentres as not meeting the challenge of sustainability or leading to positive socio-economic change, Coward points out that "*sustainability is not required for developmental impact, and one question is whether they offer enough value that they should become supported as public goods, like schools and libraries*" (Coward, 2008: 4). If telecentres in South Africa were provided as a free service, similar to that of libraries, it would serve as a long term contribution to society's human capital.

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