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A needs assessment to identify the reality of two rural school cases in South Africa: Potential for ICT4D or not?

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ABSTRACT

Understanding the potential or need for ICT support in education within developing countries, requires an in-depth needs assessment to comprehend, elaborate and set the desired priorities of rural schools. A Needs Assessment was conducted as part of an on-going comprehensive evaluation process of an ICT for development project, the Siyakhula Living Lab. The needs assessment focused on an elaboration of a high level need, 'access to education and knowledge', identified in a Baseline Study of the community. The needs identified were based on an understanding of the existing operation of local schools, from the perspectives of local representatives who are more familiar with their environment and its challenges. This paper presents a report on the findings of the Needs Assessment, which include: 1) the elaborated needs and priorities for developing access to education and knowledge in a rural area, and 2) proposed solutions to address these development needs. Examining these elaborated needs indicate that potential solutions to address them are beyond the scope of computer science and information systems, and should also include other development solutions, such as, education, government, sociology, *etc.* The Siyakhula Living Lab still needs to build on the expertise available, in order to propose diverse solutions that can support the integration of the technology within the schools. A description of the contribution of the needs assessment for subsequent or future evaluations of the Siyakhula Living concludes the report.

Keywords*: Needs assessment, rural, evaluation, education, living lab*

1. INTRODUCTION

A Needs Assessment for a rural ICT project aims to comprehend, elaborate and set desired priorities of the rural community the project endeavours to support. It also allows for an opening position between the project implementation team actors and the recipient community, hence revealing pre-existing assumptions and aspirations of the project (Harris, 2001). The evaluator works with different groups in the community to assess their needs, especially also considering the unique needs of discriminated groups, such as women and youth (Macome & Cumbana, 2002). Needs that can be identified in this case relate to livelihood resources essential for rural development, such as economic/financial capital, natural capital, human capital, social capital, and informational capital (the different resources are linked, whereby for instance, the expansion of information capability can have a multiplier effect on other forms of resources) (Gigler 2004; Madon 2004). A Needs Assessment constitutes one of the seven domains of evaluation of the Rural ICT Comprehensive Evaluation Framework developed by Pade-Khene & Sewry (2011). It is conducted during the inception or development phases of the project's life cycle, and is repeated when *demand-driven needs* emerge in the community, as the technology is gradually integrated into the daily livelihood activities of individuals and groups. For instance, as local teachers use computers and the Internet, they may have a growing interest in how to integrate computer literacy in the school's curriculum, or use Internet resources to enrich the teaching and learning process. This contributes to the introduction and implementation of new ICT solutions to

support rural development activities; hence repetitions of subsequent evaluation domains, as ICT sub-projects are added overtime.

An awareness of the elaborated needs of a community positions an ICT project and its stakeholders to propose relevant solutions that aim to address the development challenges highlighted in a Baseline Study of the community (Pade-Khene, Palmer & Kavhai 2010). Therefore, *prior* to conducting a Needs Assessment, a Baseline Study should be conducted. A Baseline Study is centred on the generation and contribution of knowledge through describing the nature of a project's environment or the socio-economic status of a community, to inform external and local stakeholders. The Baseline Study is a useful resource to guide the Needs Assessment as it highlights key needs and priorities identified though an analysis of existing challenges and values in the rural community. Once the project has an understanding of the existing status of the community's *general* needs and priorities, a more in-depth needs assessment can be conducted. In this case, a general need identified in the Baseline Study can be assessed further to propose specific ICT solutions for supporting a particular information and communication need. The needs assessment that this paper presents, focuses on the elaboration and analysis of the *'Access to education and general knowledge'* need identified in the Baseline Study, for rural Dwesa, in the Eastern Cape of South Africa. Other general needs identified in the Baseline Study are planned for assessment in the future evaluation of the Siyakhula Living Lab, as a comprehensive evaluation is applied iteratively throughout the life of the project.

2. THE SIYAKHULA LIVING LAB

The Siyakhula Living Lab is an ICT4D project that exists to provide new technology and skills to the rural community of the Mbashe municipality, specifically in Dwesa on the Transkei wild coast of South Africa. It was launched in 2005 as a collaboration between the Centres of Excellence at the University of Fort Hare and Rhodes University. Siyakhula is a Xhosa word that means 'We are growing', as the project would desire: it aims to grow in its innovation and sustainability. The primary objective of the SLL is to develop and field-test a distributed, multifunctional community communication platform, to deploy in marginalised and semi-marginalised communities in South Africa, where a large number of the South African population live. The second objective of this project is to equip people with technical skills in the field of e-commerce particularly (but by no means only to support e-commerce activities). Tertiary level students will also gain skills through exposure to the processes of applied research and by experiencing actual ICT projects in their area. This second objective in turn supports the first. (Pade and Sewry 2009)

The project is aimed at developing and supporting local art, craft and e-tourism in the Dwesa region, as the community is located within a nature reserve. However, the initial stages of the project focused on supporting local school and teacher development, through ICT supported education services; this with the aim of teachers later training community members. The Needs Assessment was conducted at a stage when the project had been operating in the schools already, and teachers and students had the opportunity to use the technology. However, no formalised needs assessment had been conducted in the Siyakhula Living Lab.

3. METHODOLOGY – THE NEEDS ASSESSMENT PLAN

The instruments used to collect data on local needs were predominantly qualitative. A qualitative approach provides rich textured knowledge to elaborate on the needs identified in the Baseline Study (Creswell, 2007). The initial Needs Assessment for 'access to education and knowledge', was conducted during the period, 8-10 September 2009. Two schools were chosen to participate in the assessment, as sample sites. These two schools had been the most active project sites in

the community since the inception of the project in 2006, and were therefore key pilots in understanding the needs of the local schools.

The Needs Assessment caters for two groups of needs:

1. The initial needs identified (usually before implementation or the emergence of demand driven needs)
2. The demand-driven needs that emerge as the technology is integrated into the livelihoods of the community, or the teaching and learning systems of local schools.

As a result, the Needs Assessment plan consists of two sections that each address or guide the two different groups of needs. However, this paper only reports on the initial needs assessment, hence the demand-driven needs assessment plan will be presented in future publication.

3.1 The Initial Needs Assessment Plan

The initial needs assessment plan describes the aspects that guide the assessment process, that is, the evaluation questions, the methods and procedures applied, and stakeholder participation.

3.1.1 The Evaluation Questions

- What are the development services needed for supporting access to education and knowledge at School A and School B?
- What are the proposed and existing approaches or service delivery arrangements for supporting access to education and knowledge at School A area and School B area?

3.1.2 The Methods and Procedures

A combination of qualitative approaches was used to collect 'access to education and knowledge' needs. Representatives from School A and School B were chosen to participate and inform the needs assessment. They consisted of teachers, and Headmasters from both schools. The instruments used include:

- *Interviews:* These were aimed at Headmasters, to understand the existing operation of the school and clarify the needs associated with 'access to knowledge and education'. Furthermore, challenges associated with the operation of the school, and suggestions for improvement were discussed in the interview.
- *A focus group and narrative discussion:* Needs were gathered from School A and School B teachers through a focus group discussion. This approach proved to be appropriate and effective as teachers collaborated and agreed on an elaboration of key needs. However, where certain aspects differed for each school, these were highlighted. Most discussions were associated with narrative descriptions of the existing needs associated with access to education and knowledge.
- *Photography and audio recording:* Photographic evidence of the schools and their operations aided in describing the needs. Audio recordings also supported the collection of discussions and narratives, to reflect the opinions of local participants in the assessment.

3.1.3 The Nature of the Evaluator-Stakeholder Relationship

- *Participatory Evaluation:* The evaluator consulted with the local project champions to select appropriate local representatives to participate in the focus group discussions, and

plan the organisation of the discussions. They understood the teaching, learning and management process at their schools, the operation of the Siyakhula Living Lab at local level, and appropriate local informants or representatives to participate in the focus group discussions.

4. THE BASELINE STUDY REVIEW OF THE HIGH LEVEL NEED - ACCESS TO EDUCATION AND KNOWLEDGE

The need 'access to education and knowledge' identified in the baseline study is the focus of this needs assessment. Education, so fundamental to growth in developing countries, has been seen as key to building a dynamic labour force, one that is capable of accessing and integrating knowledge into their economic and social livelihood activities, and thus able to participate in the global economy (McNamara 2003). At the local level, once rural people have access to information and expertise, they can address impediments and vulnerabilities that previously blocked them from opportunities to improve their lives. They should then be able to participate in sectors that require greater skills and therefore offer new or higher income. The following high-level needs were identified in the Baseline Study, which are based on an elicitation and analysis of the values and challenges of rural schools in Dwesa: 1) Educational research, 2) School management, 3) School collaboration, 4) Teacher training, and 5) Initiatives for development projects.

5. AN ELABORATION OF NEEDS

An elaboration of needs is based on an understanding of the existing operation of schools, from the perspectives of local representatives who are more familiar with their environment and its challenges. From a local representative's point of view, the project team is able to articulate the rural schools' development needs, especially based on factors that are essential to build and support the existing school environment. The rural schools' perspective is not influenced by proposed technology solutions that can deter the perspective of local representatives from building on what they already have. In other words, the evaluator was careful to not propose technological solutions to address their needs, but rather allowed the local representatives to communicate their needs based on their existing competencies and local opinions on approaches for addressing their 'access to education and knowledge' requirements. Sutinen (2009) recognizes this approach as a strength-based approach for eliciting rural needs, where the local educator is not provided with a list of technologies to attempt to apply in their school, but rather an examination is made of their existing strengths and capacities, which need to be improved, in order to address the development challenge. Therefore, descriptions of the nature of the development needs are based on 3 key viewpoints to elaborate on the high level needs identified in the Baseline Study:

a) How it currently operates.

b) The existing challenges and problems of how it currently operates.

c) How the educators feel the existing approach could be improved.

5.1 Educational Research

Educational research at the school describes the approach used to access educational material to support the teaching and learning process. Currently, there are only four sources of educational research material available for teachers and students to use. These include:

- *Textbooks* provided by the Department of Education, which are the main source for educational research.
- *Educational posters* in the classrooms.
- *Relying on parents* to provide students with information on the background and history of the local rural area and surrounding parts, as well as supportive general knowledge.
- *Internet access* through the Siyakhula Living Lab, to provide teachers and students with access to educational information online.

5.1.1 Challenges

The challenges that hinder educational research in the rural schools include the following:

- *Insufficient educational material:* The educators feel the material they have available for educational research is insufficient. For instance, School A has no videos, televisions, or enough books to support educational research. Moreover, relying on parents is limiting, as this depends on what they know or have experienced.
- *Classrooms are not safe and often in a bad condition:* This results in the theft of classroom material (for example, posters), and the vandalism of infrastructure. Furthermore, some classrooms have leaks when it rains, therefore teaching material may be destroyed. This is a major challenge for School A.
- *No library:* There is no library that serves any of the schools in the area, which the teachers emphasize as a negative characteristic of most rural schools. The limited numbers of books they have are often packed in boxes in the staff rooms, which the students are unable to easily access.
- *Challenges associated with computer reliability:* Internet access was unavailable at School B for a number of months (however, this has recently been resolved). The teachers at School B felt this was a challenge as they were unable to use online material (usually accessed via the Google search engine) to support the learning process, which they had become dependent on. Furthermore, some computers do not work, often freeze, or are too slow.
- *No computer room at School A:* Currently, the computers at School A are kept in the staff room. The staff room is the only secure room in the school, and consequently teachers are unable to teach computer literacy to a whole class. Often, only a small group of students can enter the staff room to do occasional research for the class, with the teacher's supervision. Nevertheless, the new management at School A is planning to raise funds to secure one of the classrooms at the school, for future computer literacy training.
- *Plagiarism:* Students who use the internet to research often plagiarise their findings. The teachers do not know how to handle or deal with plagiarism in the school. They appreciate the resourcefulness of the Internet, but plagiarism influences their confidence in encouraging their students to use the Internet for their research.
- *Slow delivery of textbooks and books:* The schools often make orders for books and textbooks from bookshops, through the Department of Education (DoE). However, the bookshops often fail to deliver, and the DoE is expected to make a follow-up, which hardly occurs. There may be a lack of communication to follow-up on rural school orders, or an approach for responsible officials to account for the orders. On the other hand, the Headmistress felt that the delivery of textbooks had actually improved, as a delivery is made at the end of each year. It is the responsibility of teachers to travel all the way to Idutywa to collect textbooks delivered at the District Office, which proves to be a

challenge with limited transport available. The local transport available to Idutywa, known as 'Boga Boga', is only available in the early hours of the mornings, and late in the afternoon when returning. Therefore, teachers who are meant to be teaching on a particular day will often spend the whole day having to collect textbooks. The District office does not make textbook deliveries to each rural school.

- *Student challenges linked to the National Curriculum Statement (NCS):* Teachers are required to teach students using the National Curriculum Statement (NCS)[1] syllabus. However, the NCS is challenging for most students who are unable to read and write appropriately, as teachers are required to give them tasks specific to the syllabus. Students in rural areas are not familiar with the NCS approach imposed on them, which teachers feel is more customised for urban areas than rural areas. For example, if students who have never been exposed to this approach of teaching are given a research assignment to do, they are often unable to do or complete the work, because they struggle to comprehend what is required (given the lack of access to sufficient educational material); although teachers would have repeatedly tried to explain the class work to the students. The teachers believe that if students had better access to educational material, this may improve the adoption of the NCS syllabus in rural schools.

5.1.2 Recommendations for Improvement

The educators suggested the following as recommendations for improvement to support educational research:

- *The development of a library to serve local schools:* Currently, the schools in the Nqabara-Dwesa area are collaborating to implement a library at one of the schools, Pathilizwe School. Nevertheless, the teachers still feel the location of the library will pose a challenge for surrounding schools that hope to benefit from the library, because of the lengthy distance and transport limitations for students.
- *An increase in computers:* This was a recommendation made by School A, to support the introduction of computer literacy as a subject at the school. However, they are still aware that the key requirement for this is to secure a classroom that can be used.
- *Improved access to funds:* This is a recommendation from School A to improve classroom infrastructure and prepare a classroom to house computers for literacy training. Furthermore, the school management is keen to purchase new computers or apply for some through the DoE.

5.2 School Management

The management of schools is mainly the responsibility of the school Headmaster, with the assistance of teachers. The Headmaster/Headmistress delegates tasks to teachers to support the administrative and management tasks in the school. In addition, the teachers assist in the management of extracurricular activities to guide and support the learning process. The organisation of management tasks is usually communicated through occasional staff and community meetings. Central to the school management process, the Department of Education introduced an Integrated Quality Management System (IQMS), which oversees and measures the performance of educators, to improve the quality of teaching and learning (Parliamentary Monitoring Group, 2009). This requires teachers to attend workshops and meetings to support the administrative operation of the schools.

5.2.1 Challenges

The challenges associated with school management in the rural schools include the following:

- *Challenges associated with the IQMS:* Paper work and administrative tasks associated with applying the IQMS in schools is time consuming and interferes with classroom time. Such administrative work requires educators to continuously communicate with each other and discuss problems, especially through holding meetings, which interfere with time dedicated to teaching. In addition, the teachers are required to attend whole day workshops for IQMS, which affect classroom time, given the fact that there are not enough teachers in the school to support continuous teaching in the absence of other teachers attending workshops.
- *Demanding management responsibilities:* Some teachers hold too many responsibilities at the schools; therefore the delegation of work may be inappropriate and too demanding on individual teachers. For instance, an individual teacher may be a School Governing Board (SGB) member, choir master, entertainment committee member, computer literacy trainer, as well as a teacher. Furthermore, communication among teachers, linked to school management is insufficient; therefore, appropriate mechanisms are not in place to deal with school management and operation tasks and challenges effectively.
- *Meeting Attendance:* Given the many responsibilities educators hold, it is also becomes a challenge to hold community and SGB meetings which are often attended late. For instance, meeting participants are informed to attend a meeting at 10am, but only arrive at 1pm or 2pm.

5.2.2 Recommendations for Improvement

The educators suggested the following as recommendations for improvement in school management:

- *Employment of more teachers in rural areas*: The Government needs to employ more teachers to take over certain responsibilities and subjects in the school. For instance, a teacher currently teaches three subjects, for three different classes/grades. The teacher may not have time to do all their delegated school management tasks as well as teach students effectively. The teachers suggested that a teacher should at least teach one subject for three different classes. However, the teaching and management requirements are associated with the National Curriculum Statement which they are required to follow. This involves paper work and departmental moderation every three months, of which DoE officials expect teachers to perform well. Increasing the number of teachers may improve teaching performance.
- *An improved mechanism to communicate school management issues:* Rural educators have attempted to communicate their challenges associated with the IQMS and National Curriculum Statement (NCS) system to DoE officials, but have often received insolvable responses. For instance, a suggestion to employ more teachers is often responded with a remark indicating the DoE does not have sufficient funds to employ more teachers, which they assert to be a problem in South Africa.
- *Management training:* This was indicated as a key requirement for rural schools, as most teachers have not received any training in the formal management of the school. This would improve the effectiveness of school management at local level.

5.3 School Collaboration

Rural schools are required to collaborate with other schools to participate in extracurricular or educational events, and to share customized knowledge to support the teaching and learning process. However, school collaboration in Dwesa is characteristically limited to local collaboration, with no national or international school collaborations. The common reasons for local school collaboration include:

- *To organise and hold sports and cultural events:* For example, cultural days, inter-schools athletics, and choir competitions.
- *Academic competitions:* These are held to promote the standard of the National Curriculum Statement (NCS). Competitions are held for all key subject areas, to examine if the students are coping with the NCS approach.
- *To discuss NCS challenges:* Some teachers do not understand certain aspects of the NCS; therefore, they need to communicate with each other to discuss their challenges and share advice for addressing these challenges.
- *To hold cluster meetings:* Each school in the area belongs to a particular Cluster or Circuit, which meets and collaborates to share knowledge and resources specific to the schools that belong to that Cluster. School A and School B are part of a group of nine schools that belong to the Nqabara Cluster in the Mbashe municipality.
- *Collaboration between project sites:* School A and School B are both project sites for the Siyakhula Living Lab. Therefore, the project champions or teachers who use the computers available or are involved in local computer literacy training communicate to share ideas or seek advice in addressing problems associated with computer use.

Communication among schools to collaborate is often conducted through meetings and writing letters. For instance, at the beginning of each year, a School Cluster meeting is held with educators and school committees, where a plan for school collaboration throughout the year forms part of the agenda. However, in the case of spontaneous events of emerging meetings (for example, sports and cultural event meetings, or Principals' meetings) throughout the year, cellphones are used to communicate with participating schools.

5.3.1 Challenges

The challenges associated with school collaboration in the rural schools include the following:

- *Transportation limitations:* The rural areas of the Mbashe municipality are characterised by mountainous land, with deep valleys and high rolling hills, hence settlements and schools are quite scattered and distant from each other. As indicated earlier, the 'Boga Boga' are the only transportation vehicles available, which are scarce and relatively expensive to use. This poses a challenge for school collaboration events, as transport is needed for students and educators to attend sporting or cultural events held at different schools. At times, some schools or students are unable to attend events because of a lack of transport. Teachers are also unable to attend essential Cluster meetings, as the 'Boga Boga' transport space is limited and other community members make use of the same transport. For those that are able to attend the cluster meetings, it can still sometimes be difficult to get transport back home. Therefore, even if a cluster meeting ends early, teachers have to wait for the whole day to get transport back. Transport remains a challenge in rural Dwesa.
- *The operation of existing ICT:* During the period the needs were elicited, the teachers indicated the Internet was not working, and therefore they were unable to collaborate as much as they used to. In addition, the IP phones that also enabled communication

between School A and School B, had not been working since the beginning of 2009. Nevertheless, the Internet at School B is current working again. The problems associated with Internet and IP phone access relate to challenges of communicating the problem efficiently to the SLL project team, and possibly a misunderstanding among local representatives of how to keep the Internet operating. For example, the routers and servers should not be switched off but left on, even after school hours, so as to keep the Internet working.

- *Pending telephone landline applications:* A landline (telephone) can support school collaboration. However, schools had applied for a landline from Telkom a few years ago, but have failed to receive any response or feedback on their application. Teachers are frustrated that they have been provided with a fax machine, but they are unable to use it, because they do not have a landline.
- *Airtime expenses:* Airtime is expensive for rural teachers, and as indicated in the Baseline Study (Pade-Khene, Palmer and Kavhai, 2010), most community members can only afford to purchase airtime once or twice a month, on average. Therefore, it is too expensive for educators to use cellphones for school collaboration discussions.

5.3.2 Recommendations for Improvement

The educators suggested the following as recommendations to improve school collaboration between the different communities in the rural area:

- *Provide surrounding rural schools with computers:* The teachers felt that if neighbouring schools also had computers, this would improve communication and school collaboration in rural Dwesa, through ICT approaches.
- *Assistance with Transport:* The schools require assistance with transport designated for supporting school collaboration efforts in the rural areas.
- *A landline telephone:* If the schools have a landline provided by government, it would make collaborations and the organisation of events more affordable and efficient, as it is cheaper to use a landline than a cellphone.

5.4 Teacher Training

Teacher training is an essential component needed to maintain and improve the quality of education in rural schools (McNamara 2003; Wagner, Day, James, Kozma, Miller and Unwin, 2005). The Department of Education provides training for the Mbashe District at centres in Idutywa. There is no training that actually takes place at the school's location or within Dwesa. Examples of key training programmes provided by the DoE include National Curriculum Statement (NCS) workshops and Integrated Quality Management System (IQMS) workshops to improve the teaching and learning process. The Siyakhula Living Lab has also introduced in 2009, training provided locally (at the school) and targeted at local teachers. These programmes include:

- *Conectando Mundos*[2]*:* This programme aims to provide a space for teachers and students from different social, geographic, economic and cultural environments to participate in intercultural dialogue, sharing different realities and discovering challenges associated with lifestyles and development globally. The platform for this dialogue was supported by ICT, and hence the participants made use of the computers and Internet available through the SLL. This was a once-off training programme at School A, where teachers from School B and School A received training and guidance over two days, with clear instructions on how to participate in the programme online. The teachers

appreciated the experience and opportunities to meet and converse with participants from different countries. They are keen to continue with the programme; however, they are unsure of the next steps associated with continuously using Conectando Mundos. How can they apply it to their teaching and learning process? They are wondering whether they should be creative and think of ways to apply it to their schools.

- *The Pre- ACE (Advanced Certificate of Education) in Information Communication Technology Course:* This training programme is provided through the Education Department at Rhodes University, and aims to train teachers in ICT education for schools. It consists of two stages. Stage 1 aims to provide 80 hours of contact with teachers over a period of months, to enable them to become computer literate, an essential prerequisite for the full ACE programme. Subsequently, stage 2 focuses on the implementation of a full ACE training programme, which aims to improve school-based ICT learning and to give teachers the opportunity to advance their qualifications and skills to improve the rural educational process. The programme was conducted at School B, which was chosen as an appropriate location for security and supportive reasons.

5.4.1 Challenges

The challenges associated with teacher training for rural schools include the following:

- *The short duration of training programmes:* This challenge is specifically associated with training programmes provided by the Department of Education for the National Curriculum Statement or Integrated Quality Management System. Training that is meant to take 2-4 weeks is often implemented by officials over a duration of only 1-3 days for teachers. Teachers are then expected to understand and apply their training to the educational process at their schools. This is obviously difficult for teachers, as courses are often hurried and difficult to understand over a short period of time. Teachers have attempted to complain to subject advisors or officials, but the only insolvable feedback they have been given is that, there is not enough time to conduct courses, and the officials are under strict orders from their directors. Subject officials also indicate to the teachers that it is difficult to communicate with the DoE to address challenges associated with the training they are required to provide. There appears to be underlying problems associated with communicating effectively with the Department of Education. Further, the officials are known to receive training in the right duration of time (2-4 weeks), but when they train rural teachers, the process is hurried, with no substantive reason why it is conducted that way.
- *Unreliable training programme schedules:* Training is only conducted in Idutywa, therefore, teachers are required to organise their own transport to the training centres (yet transport is limited in rural areas). However, the training schedules are at times unreliable, as the officials sometimes cancel training sessions, of which teachers are only informed of when they reach the training centres in Idutywa. As a result, teachers would have wasted money, as well as time, in an attempt to attend a cancelled training session that they were not informed of early enough.
- *Limited and incomplete training documentation:* Teachers are often given documents or handouts to support the training process, which are essential in understanding the training programme. However, the documents are occasionally incomplete and not enough for all teachers. Furthermore, the DoE sometimes only gives teachers CD-ROMs, yet most schools do not even have computers or electricity, nor are the teachers computer literate. As a result, it is the responsibility of teachers to make paper copies for themselves. If their school has a printer or photocopying machine, they are at an advantage. However, within the Dwesa area, School A and School B are the only schools that own a printer or photocopying machine. Therefore, School B teachers have to make

copies and print documents using the school's limited resources (ink, papers, as well as time). This has obviously put a strain on the school's limited resources.

5.4.2 Recommendations for Improvement

The educators suggested the following as recommendations for improvement to support teacher training:

- *The duration of training should be improved:* Sufficient time should be allocated to training sessions to allow teachers to understand the programmes and clarify any aspects they do not understand. It was suggested that teachers should at least be provided with training over 1 or 6 months, and apply what they have learned over a longer period of time. This would be more effective than short courses which are hurried and difficult or impossible to apply.
- *Training needs to be conducted locally:* Local training would support teachers significantly as they would use the time available to clarify aspects they do not understand. It would also save on transport costs, and allow more time for teaching, as lessons do not have to be cancelled in order to attend training programmes (time is spent travelling and returning from Idutywa, with limited transport availability).
- *Appropriate and sufficient documentation should be provided for training programmes:* Training documentation provided needs to be sufficient for all teachers and easily useable by rural teachers.

5.5 Initiatives for Development Projects

The schools are not particularly involved in supporting existing development projects in Dwesa. The reason given is that the schools are struggling as it is; therefore it is a challenge to support development initiatives. The Siyakhula Living Lab, however, is the exception, as computer literacy training for the community is provided at the school by trained teachers and community members. Currently, training is only limited to basic computer literacy, and not necessarily ICT training to support livelihood or development initiatives community members are involved in, such as, arts and craft, healthcare, and agricultural development.

5.5.1 Challenges

The challenges faced in supporting initiatives for development include the following:

- *Education and language challenges:* It is often difficult to train community members who lack basic knowledge or education, which is essential for understanding the different functions of a computer. Some community members may have only achieved an education level of Grade 1, Grade 3, or Grade 6. Furthermore, the computer interface is in English, which is not commonly spoken in rural Dwesa. Although the Edubuntu platform used on all SLL computers has an isiXhosa version, the terminology is still difficult for community members to understand. Education and language constraints are especially a challenge for the elderly, who struggle to understand the technology. As a result, most of the adults are under the impression that the computers are only for the educated ones, and are therefore reluctant to receive training.
- *A lack of continuous training attendance:* Community members who initially attend training sessions eventually stop attending as they are unsure of how to apply what they have learned, to their livelihoods. The teachers indicated that they attempt to explain to them that it would be good for their future, and they would be able to receive certificates

for it. However, the teachers feel that most community members have not received sufficient training to obtain a certificate anyway. There is no formal process to follow in training individuals to attain a credible level of computer literacy, and a certificate as proof of computer literacy skill. The pre-ACE course is only provided for teachers.

- *Unfulfilled expectations:* SLL researchers have endeavoured to encourage community members to attend training and use the technology to support their livelihoods. However, they have been fed high expectations of the project, such that when these expectations are not met or local individuals are not informed of the progress of meeting these expectations, they lose interest in the project. For example, local arts and crafts people were told they would sell their craft over the Internet, but nothing had happened. Therefore, they kept on asking, *"When is this going to happen?"* because they have the arts and crafts ready for selling. Other community members were informed that they would be able to apply for an ID via the Internet, and government offices in Willowvale would contact them to collect their IDs. However, no guidance or training was provided for this, and the community is still expectant and waiting. Unfulfilled expectations may instil a wrong impression of the project. Consequently, the project may not be taken seriously in the long-term.
- *The extra workload for teachers:* Community training is only provided by some teachers and staff at the school, in the absence of the project team. As a result, community training is limited to some afternoons during the week. Teachers are currently challenged with the workload, because they teach students all day, and then have to provide training to community members after school hours. Furthermore, other teachers who need training fail to have enough time to attend computer literacy training because of their school teaching commitments.

5.5.2 Recommendations for Improvement

The educators suggested the following as recommendations to improve and support initiatives development:

- *Supplement the computer training with other learning/educational areas:* Education and language challenges can be addressed by supplementing the literacy training with adult education training in other learning areas. This will enable community members not only to understand the terminology, but possibly propose different ways of applying their training to their existing livelihoods. For example, the computer literacy training can be supplemented with the Adult Basic Education Training (ABET) programme. ABET is targeted at adults who would like to complete basic education, and aims to provide basic learning tools, knowledge and skills, in order to attain a nationally recognised qualification (Cape Gateway 2009). It is currently not provided at School A and School B, but at Nqabara High School, which is one of the SLL project sites.
- *Hire a community member to assist with training:* A community individual or group to assist teachers with training will ease the workload for those involved in training. Furthermore, someone who can supervise the community training process can also be responsible for locking up the school, and hence enable training to occur during weekends.

6. A REFLECTION

The elaboration of needs is based on the perspectives of local educators in Dwesa. An elaboration of these needs reveals that the development services required to address 'access to

education and knowledge' is not only limited to information or ICT services needed, but other development needs, such as, transport infrastructure and availability, and curriculum restructuring. This confirms that ICT4D is not a panacea for development; it does not create change, but rather enable changes where it can (McNamara, 2003). It is only considered as one of the supportive tools in development.

A Needs Assessment is critical for the design of a new ICT project; however Rossi, Lipsey & Freeman (2004: 102) states that it can also be applied in established projects when it cannot be assumed a project is needed, or the current services applied are well suited to the nature of the need. This is the case with the Siyakhula Living Lab, as the assessment was conducted four years after it was first implemented. Therefore, the details of the elaboration of needs include a discussion of ICT use and application aspects within the rural schools. This Needs Assessment also reveals needs associated with challenges of using the technology as well as recommendations for improving its application in the school, specifically according to the teachers. The next step was for the evaluator and project team to review these local needs, confirm how the existing ICT service support or are still to support these needs, and propose future ICT services as well as general development solutions or recommendations for addressing local needs and priorities associated with 'access to education and knowledge'.

7. PROPOSED SOLUTIONS OR SERVICES

The proposed solutions or services were created from an awareness of the values and challenges that characterise the rural schools of Dwesa. Potential solutions are proposed for each elaborated need linked to 'access to education and knowledge. The initial list of solutions was proposed through a workshop with project team, consisting of individuals from the computer science field, and a participant from the anthropology field. The solutions are mostly related to the use of ICT, as development solutions may be out of the scope of the participants expertise, which may require education and government based solutions from experts more familiar with the field (for example, development studies, education, social studies, *etc.*). The solutions are based on existing ICT available through the SLL, and potential solutions that can be applied in the future to the living lab. The list of solutions is likely to change and/or develop further over time. Different solutions may emerge over time with the experience of existing and new researchers or project team members. Furthermore, the report can be developed further to accommodate demand-driven needs.

7.1 Overall Solutions

These solutions apply to all the needs elicited for 'access to education and knowledge, and, hence are not specific to addressing one need. The overall solutions include:

- ***Engaging with the Department of Education (DoE):*** Several of the challenges and recommendations elicited indicate that rural schools need to be in a better position to engage with the DoE in addressing their needs and priorities. Given the history of the SLL in collaborating with the DoE and the Deputy Minister of Science and Technology, stakeholders of the project can possibly propose communication platforms to support the engagement of rural schools with key DoE representatives in attempting to address local needs. Communication platforms enable the DoE to be directly aware of local needs and priorities, and provide a direct link for rural educators to obtain advice and guidance to support the teaching and learning process.
- ***Addressing computer reliability challenges and unfulfilled expectations:*** This requires a number of processes and implementation interventions associated with the operation of the Siyakhula Living Lab. These challenges occur at local level within the

schools, and externally, in relation to the management of sub-projects and researchers involved in the living lab. Therefore, such issues need to be discussed within the programme theory and process assessment of the project, so that appropriate mechanisms can be proposed to support the operation of the Siyakhula Living Lab, both locally and externally. Nevertheless, a recommendation for avoiding computer reliability issues related to the mishandling of ICT equipment at the school was to create posters with rules and guidelines in Xhosa. This information will be targeted at anyone who uses or interferes with computer equipment at the school, for instance, while cleaning the classroom. Unfulfilled expectations can also be avoided by informing all researchers of the protocol for working in rural development, the status of the community (Baseline Study report), and managing projects to ensure sub-projects are conducted appropriately.

7.2 Education Research Solutions

- ***The Gutenberg Project and Wikipedia:*** These are offline versions of educational material available on the computers at the schools, which teachers can access, especially when Internet access is unavailable. Updated versions, however, can also be accessed via the Internet. The Gutenberg project provides access to a collection of free online books. Wikipedia is a free content encyclopaedia of information on many different subject areas collaboratively written by people around the world. Rural school teachers and students need to be encouraged to use these resources already available to them. This solution is of course limited to schools that have electricity and computers from the SLL.
- ***Creating a digital library:*** The DoE could possibly play a role in obtaining copyrights for some educational books, to create a digital library and hence allow access to more educational material for schools to use. Nevertheless, this again is limited to schools with electricity and computers through the SLL. The SLL will need to collaborate with the DoE to make this initiative possible.
- ***Procedures for avoiding plagiarism:*** Teachers need to receive guidelines on how to use online material to support the teaching and learning process. For instance, if teachers require their students to research using online material, they should first select a few websites, with which they familiarise themselves. Subsequently, they should instruct students that they are limited to a list of sites for research, which they are required to reference in their assignments. In addition, the students should be informed that there are penalties for plagiarising. As a result, when the teachers review the students work they are in a position to determine whether the student has plagiarised, and hence penalize the guilty student so that such conduct is avoided in the future.

7.3 School Management Solutions

- ***Supporting the Integrated Quality Management System (IQMS):*** This management system can be supported by ICT by providing a process to gather together information collected by teachers. This limits paper work, and provides teachers with continuous access to information collected by different teachers. As teachers are continuously informed about the progressive management and performance of their schools, ICT can provide a platform to communicate emerging issues in real-time. This may limit the need for many meetings to discuss issues that can be solved electronically, hence allowing teachers to dedicate enough time to teaching and other school extracurricular activities.
- ***SchoolTool support for school administration:*** SchoolTool[3] is a free school administration software system which can be used as a comprehensive student information system, to manage and record demographics, grade books, attendance, calendars and reporting. This software is available on all the computers at the schools.

The teachers simply need to be aware of SchoolTool and receive appropriate training to use it.

- ***Sending mobile SMS to coordinate meetings:*** The SLL intends to implement a Village Connection (VC) project that provides cheaper mobiles services locally. This would enable schools to remind and inform school meeting participants to attend meetings at the scheduled times via sms. Currently, the VC project has been halted as a mobile service provider had pulled out as a key network provider, essential to the operation the VC project.

7.4 School Collaboration Solutions

- ***Using affordable mobile services to coordinate transport:*** The VC can provide cheaper SMS services to coordinate transport locally. For instance, villagers on request, could be informed of where and when transport will be available during certain times of the day.
- ***Providing alternative approaches for meetings:*** This specifically applies to local cluster meetings that educators are required to attend. For instance, video conferencing or webcam facilities may facilitate cluster meetings between different schools, thereby not requiring teachers to travel to meeting venues (which have proven to be a challenge because of a lack of transport).

7.5 Teacher Training Solutions

- ***The Pre-ACE course creating a centre for teacher training:*** With the collaboration of the DoE office at Idutywa, the ACE training programme aims to initiate a centre in the Dwesa-Nqabara area for training teachers in rural areas. It will be the first time in South Africa that teacher training will be conducted where rural teachers work and live. The DoE needs to be convinced to use such a centre for training other subject areas, or other related education disciplines. The creation of a training centre may also stimulate other development services, such as, the provision of commercial accommodation for visiting officials and trainers.
- ***Online training material and guidance:*** This will enable teachers to have access to extra or supporting training material to improve their understanding of the training they have received. However, this solution may only be limited to school that have access to electricity, computers, and the Internet.

7.6 Initiatives for Development Projects

- ***Addressing a lack of continuous training attendance***

    a. *A training structure and register to keep track of the training progress:* A formal training structure is required to guide the community training process, and keep track of the training that community members have received. This avoids repetitions of computer literacy subjects that some community members may deem as uninteresting and unnecessary (although repetition is essential for some community members who struggle to understand). Once the trainees have a track record of attendance, and an appropriate assessment of their progress is done, they are eligible to obtain certificates of training that can be used as proof of computer literacy skills, which may be beneficial to those, for instance who plan to apply for a job.

    b. *Consulting with trainee dropouts:* A number of social and cultural issues exist that discourage community members from continuing with or attending computer literacy training. These issues need to be investigated so that the project team

can work closely with local individuals to address some constraints, and hence encourage individuals to attend training. Possible incentives, such as computer literacy certificates or successful entrepreneurial endeavours through the support of ICT, may encourage community members to attend training.

- ***Recruit researchers from diverse disciplines or fields:*** ICT4D has emerged as a diverse field that is beyond the implementation of technology (computer science and information systems), to the need to understand the nature of social, cultural and economic factors that influence ICT4D projects (development studies) (Heeks 2009). This obviously requires expertise from different fields such as, sociology, anthropology, education, commerce, etc, depending on the social needs or priorities the ICT4D project targets. The SLL stakeholders have mentioned the need for research expertise, such as, sociologists, designers, and marketers to support the sub-projects that make up the SLL.
- ***Customising the Edubuntu platform in the preferred local language:*** The assessment indicated that community members struggle to understand the terminology for computer functions on the Edubuntu platform, even though it has a Xhosa version. The project team therefore suggested re-translating the terminology in Xhosa with local participants of Dwesa, in the Xhosa language translation they would understand better. In addition, it recommended to translate the training manuals into Xhosa, for those who may prefer to use the Xhosa version of the Edubuntu platform.
- ***Supporting teachers who train:*** A community member would need to be selected and hired to help teachers with training. This was suggested by the project team during the early stages of the project, but the schools have not attempted to hire anyone. They need to be advised and encouraged to hire someone, who would not only support training, but open the school for training during weekends. The project team can also support training on occasional field trips throughout the year. These solutions may ease the workload on teachers.

8. CONCLUSION

The Needs Assessment attempts to place into context the needs and priorities for development in rural Dwesa. For the need 'access to education and knowledge', the assessment expresses and elaborates on the key needs and priorities for rural schools in Dwesa. A presentation is made on a elaboration of needs identified in the Baseline Study to clearly establish the status of the need, the challenges that restrict the need from being met, and recommendations from local representatives (educators) to address these needs. An examination of elaborated needs indicate that potential solutions to address these needs are beyond the scope of computer science and information systems, and should also include other development solutions, such as, education, government, sociology, *etc.* The Siyakhula Living Lab would still have to further build on the expertise available, in order to propose diverse solutions that can support the integration of the technology within the schools, and other rural livelihood activities. Nevertheless, the report also presents potential ICT4D solutions for addressing some aspects of the elaborated needs. Over time, the SLL stakeholders will have to work closely with the community to establish additional feasible solutions (both development, and supportive ICT4D solutions), and continuously elicit demand driven needs that emerge over time. This assessment is not the final and only version for a Need Assessment of 'Access to Education an Knowledge', but is likely to grow and develop over time, as new solutions are proposed, and demand-driven needs emerge.

The next evaluation domain essential to the SLL and dependent on the Needs Assessment is Programme Theory Assessment. It assesses whether the conception or logical design of the SLL is designed to support 'access to education and knowledge' development needs in the Dwesa community. A number of project design issues emerged in the needs assessment process,

associated with the operation of the SLL. The living lab will therefore benefit from an assessment of its programme theory, and subsequently recommendations to re-design the project to effectively contribute to activities that support access to education and knowledge in rural Dwesa.

ENDNOTES

[1] The New Curriculum Statement: This is the national curriculum that schools in South Africa are required to follow. It describes *"what the curriculum requirements are at various levels and phases and give a clear description of the kind of learner expected at the end of the General Education and Training (GET) band in terms of knowledge, skills, values and attitudes"* (Maskew Miller Longman, 2009).

[2] Refer to the Conectando Mundos website for more information: http://www.conectandomundos.org

[3] Refer to the School Tool website for more information: http://www.schooltool.org/

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