The Living Lab Model of ICT for Development (ICT4D) for Effective Engagement of ICT in Rural Education

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Abstract

This paper is derived from the research which was undertaken to explore the potential and reality of the Living Lab model of Information and Communication Technology for Development (ICT4D) in the rural development context (Mosuoe, 2013). The research explored the case of the Siyakhula Living Lab (SLL), a multi-stakeholder ICT4D project in the Mbashe Municipality of the Eastern Cape province of South Africa. The paper first introduces the problem that led to the exploration of the subject. It then goes further to briefly discuss the state of education in South Africa, as the case in point, then the role of ICT in education, which has the potential to address some of the challenges in education. Also to be discussed are some of the challenges related to the engagement of ICT, particularly in rural areas, which leads to a discussion of the Living Lab approach as an alternative model that can be employed, in order to address these challenges. The paper finally takes into account the case of the SLL, as an example of the initiatives that engage this model, and a case study adopted in the research from which this paper is derived. It is revealed that through the engagement of this model, ICT can be integrated in an effective manner, and can benefit learners even in rural areas. The shortcomings of the SLL are also discussed. Lastly, the investigative methods that were adopted in this research are discussed before the conclusion.

Key words: Living Labs, ICT4D, Education, rural communities

Introduction

Education in rural areas, particularly in developing countries, is often compromised by a number of factors including the lack of infrastructure, learning materials, teachers and technology, to mention a few. In the context of the information society, the new challenge is the declining relevance of rural education for the progressively 'digital' work environment. While children in urban and mostly private schools are learning new ways of searching and synthesising information through new technologies, which ultimately improves their creativity and inventiveness, children in rural schools remain dependent on printed materials which in most cases are inadequate. The problem of rural education, therefore,

stems from the fact that these disadvantaged children from marginalised areas do not learn how to initiate information searching and analysing towards gaining knowledge.

Although the field of ICT4D in recent years has been attempting to find ways of engaging ICT even in rural areas, access to and the sustainability of ICT in rural, marginalised areas remain significant challenges. There is a lot of literature on ICT and its role in education (Hawkins, 2002; Karthikeyan, 2013; Nkenlifack et al., 2011; Tinio, 2003); therefore, this paper will not focus much on the role or contribution of ICT in education. The literature on ICT4D reveals that when such technology is introduced and integrated, the manner in which it is integrated is often too costly and highly unsustainable (Carnoy, 2004; Heeks, 2002; Pelgrum, 2001; Pelgrum & Law, 2003). This paper, therefore, discusses a collaborative model of ICT4D – the Living Lab model – and its potential in enabling effective, sustainable engagement of ICT in rural areas. It will then show how schools in rural areas can benefit from the programmes that adopt this model. The paper will take into account the case of the SLL as an example of the initiatives that engage this model. It will show how the collaboration of the four main sectors of society: government, communities, the private sector and academia, can go a long way toward addressing some of the shortcomings of ICT in rural areas. The barriers to use of ICT in rural areas will be briefly discussed later in this paper.

The State of Education in South Africa

Education is one of the key priorities that has been set by the government of South Africa. The government has established and put in place significant documents that mandate it to ensure accessibility of education to all eligible citizens. Among these documents are the Constitution as well as the 1996 Bill of Rights. Additionally, the government has subscribed to the United Nations millennium development goals, one of which proposes that governments should achieve universal primary education, as an expression of its commitment to education. This commitment has been accompanied by quantifiable results. The UNDP's 2013 report on South Africa reflects that by 2010, the country had achieved its goal of achieving universal primary education, even before the targeted year which is 2015 (UNDP, 2013, p. 37). The report further shows that high rates of enrolment and retention characterise the country's educational status at the primary level (ibid.). Enrolment and retention rates hover on 98% and 96% respectively, an increase from 96% and 89.6% respectively in 2002 (UNDP, 2013, p. 28).

While these statistics are reflective of the progress that has been made by the government and citizens, the quality of education that has been made accessible remains questionable. This is especially the case in rural areas, where the quality of education is inhibited by multiple factors. The government's efforts have largely been on ensuring that education is easily accessible but very little attention has been paid to the quality of that education. For example, the Bill of rights provides that all citizens have the right to education and to access it in the official language of their choice (Republic of South Africa, 1996). While that indeed speaks to the question of accessibility, it does not address the question of the quality of that education.

The question that can be posed then is what can be considered good quality education? According to Sterling (2001, p. 3), good quality education implies four descriptors: sustaining, tenable, healthy and durable.
- Sustaining; it helps sustain people, communities and societies
- Tenable; it is ethically defensible, working with integrity, justice, respect and inclusiveness
- Healthy; it is in itself a viable system, embodying and nurturing healthy relationships and emergence at different system levels
- Durable; it works well enough in practice to be able to keep doing it.

In this regard, while it is important to ensure that all are afforded opportunities to access education, it is equally important to pay attention and actively ensure that the form of education that is provided is able to efficiently meet the needs of society. In fact, the UNDP's report emphasised that while enrolment and retention rates have been increased significantly, what is also important is that the government translates this achievement into "educational transformation and improving the quality and functioning of education" (2013, p. 37). In the information society, it becomes even more significant to ensure that the kind of education citizens acquire stays relevant for the increasingly digital work environment. The quality and relevance of education is what determines, to a significant extent, the employability of those who acquire it. The South African educational system faces a challenge of a lack of quality assurance implementation. As a matter of fact, South Africa's education is rated nearly at the bottom of the class, coming 140 out of 144 countries that took part in the World Economic Forum study in 2013.

What has become clear is that the educational crisis in South African is not a result of financial constraints, as the country has a significant budget allocation for education. In the 2012/2013 fiscal year, the government invested R207 billion in education. The challenges of education are much more complex, and financial allocation is only part of the solution. The Department of Education in 2000 identified some of the challenges as relating to a lack of proper training for teachers, a lack of learning materials and their inefficient use in a classroom environment (Department of Education, 2000). Over a decade later, the educational crisis remains a significant challenge and poor teaching and learning continues to affect the real lives of the majority of students in the country. The shortage of teachers in public schools continues to be a significantly inhibiting factor to teaching and learning in South Africa. Central to these challenges the underlying problems are those related to maladministration and mismanagement, but also the gap between policy and policy practice (Fiske & Ladd, 2004).

ICT in Education

The use of technology in education is not a new practice. Broadcasting technologies such as radio and television have been effectively used in many societies to educate students in different areas, including rural areas. However, ICT came with a new and greater aspect which not only enables instant, easy and wider access to information, but also supports inventive creation of knowledge for innovative development (Castells, 2000). The potential of ICTs lies in their ability to make teaching and learning an interactive, diversified process that can stimulate self-initiated knowledge gain. This can thus transform education by encouraging learners to be more creative in their learning. Educational transformation is not only the result of a well-managed educational system but also of a "paradigm shift", which occurs when people change their thinking pattern and break the walls that restrain the methods of teaching and learning (Sterling, 2001). There is no doubt that ICTs have the potential to enable educational transformation and reform (Tinio, 2003, p. 3).

Additionally, the use of digital means to acquire information reduces the cost of learning through printed materials that need to be physically transported before learners could have access to them. One of the practical factors that inhibits teaching and learning in South Africa is that learning materials that need to be physically transported are often not delivered on time (Pade-Khene, 2012, p. 48). Hence, the use of ICT would ensure that learning is not significantly affected by such logistics as learners would be able to, given minimum guidance, initiate their own learning.

However, despite all these advantages of ICT in teaching and learning, it is worth admitting that access to ICT, particularly in remote areas, remains a significant challenge. Even more problematic is the sustainability of the engagement of ICT in rural areas. The section that follows discusses some of the perceived challenges of the engagement of ICT in rural areas.

Barriers to Use of ICT in Rural Areas

Rural areas are often challenged by a lack of resources (physical, financial and human) as well as infrastructure. All these being the necessary ingredients for effective engagement of ICT in any development initiative, it becomes difficult for ICT initiatives to thrive in rural milieu. As indicated by Bayes (2001) and Bhatnagar (2000), in most developing countries infrastructural inadequacy expresses itself in a lack of technology, the scope of resources availability, and the quality of services. The immediate challenge in integrating ICT in remote areas, therefore, is that of cost. Not only is it too expensive to engage ICT in rural areas, but is also very challenging to maintain the operation of ICT devices in an environment where human resource is lacking.

In most rural areas there are no technically knowledgeable people who can maintain ICT devices such as computers. Some of the teachers themselves do not know how to use computers, and therefore, engaging the use of computers in teaching in such cases is almost impossible. Even though there have been advances in the use of mobile phones, which may enable learners to have easier access to digital learning (Aker & Mbiti, 2010; Etzo & Collender, 2010; James & Versteeg, 2007; Lesame, 2014; Sethole et al., 2013), the limitation of mobile phones is that accessing documents which are large in size may be problematic. Computers are still the best way to access learning materials because of their size and capacity in terms of performance.

A lack of or unwillingness to engage effective participation strategies in planning, implementation and evaluation of ICT4D initiatives, is undoubtedly one of the inhibitors of ICT4D success (Best & Kumar, 2008; Tongia & Subrahmanian, 2006). Ironically, over the years research has revealed that the exclusion of the local people in the affairs of their own development is a counter-productive strategy, and this has made local participation to be a well-recognised practice and a central concern in rural development projects (Bergdall, 1993; Cornwall, 2008; Roodt, 2001; Tembo, 2003; Tosun & Timothy, 2003). Yet when these development projects involve ICT, the local people are being excluded. There is a consensus that ICT can, in fact, enhance local participation in many development programmes through the use of technologies such as e-government, e-health, e-judiciary, e-learning, etc. but the engagement of these technologies, surprisingly remains an exclusive process. This exclusion increases the chances of resistance from the potential beneficiaries' side, and it creates an environment which is not conducive for the sustainability of projects.

Mentioning a lack of participatory strategies as one of the challenges, however, does not suggest that there are no pre-existing conditions that may negatively affect the engagement of ICT in rural development initiatives. There are also cultural barriers that may certainly affect the implementation and sustainability of ICT4D initiatives, even though, on the contrary, personal observations do suggest that more and more people, including those in rural areas are becoming more open to the use of technology as a way of improving the quality of life. In fact, this research has also proven that the use of technologies, at least in relation to mobile phone, in the selected communities of the Dwesa region, has increased significantly. According to the baseline study of the SLL, which was undertaken in 2008, only 27% of the studied population had access to a mobile phone, either through owning one or having a family member who owns one (Pade-Khene et al., 2010a). Five years later (in 2013) this research reveals that about 90% of the studied population from the same areas have access to a mobile phone. While this does not give the entire picture on the question of cultural barriers and the use of technology, it may suggest that more and more people are accepting of technology, even though, on the other hand, it may be because mobile phones are becoming more easily accessible. The next section consists of a discussion of the Living Lab model, and its potential in addressing some of the above-discussed barriers to use of ICT.

The Living Lab Model for Effective Engagement of ICT in Rural Settings

The Living Lab model is an eco-system that enables community members in collaboration with other stakeholders in society, such as researchers and the government, to explore and co-create new technologies for social and economic advancement (Folstad, 2008; Gumbo et al., 2012; Khane et al., 2012). This model allows for the co-design, development and validation of new technologies, products and services by users in real life environments (Almirall and Wareham, 2008; Bergvall-Kareborn et al., 2009; Eriksson et al., 2005; van der Walt et al., 2009). The model is favourable for collaborative relationships between the different sectors in society, in their efforts to initiate or support the development and engagement of ICT in development activities. The model can be applied to all areas of development including socio-economic and education.

Traditionally, the Living Lab model was predominantly adopted in the business or corporate environment. Through this model, different organisations that utilise technologies would be brought together with the aim of improving their existing technologies and creating new technologies for the improvement of their productivity (Niitamo et al., 2006). The main advantage of this model was that it created an environment where primary users could co-create these technologies with developers (Almirall & Wareham, 2008). It then became clear that this model can, in fact, be utilised not only in the corporate environment but it can also be adopted by research institutions, policy makers, public organisations, etc. (Santoro & Conte, 2009). This enabled the applicability and relevance of this model to be expanded to, technically, all types of services as mentioned earlier. Hence, the adoption of the Living Lab model became highly favourable in ICT for development initiatives.

Through this model, four main sectors in society (government, private organisations, communities and academia) can come into a co-creation process, each one with a complementary role towards effective engagement of ICTs in development processes. The role of researchers from academia is to design and create innovative ICT products and service provision applications in close collaboration with the target users (Dalvit et al., 2012; Gumbo et al., 2012; Khane et al., 2011). This does not only enable primary users to be familiar with the products that they will be using, but also ensures that the products are designed, developed and deployed in a manner that ensures relevance and sustainability. In many cases, ICT products and services are copied from other contexts (mainly urban) and adopted in rural areas without taking into consideration the spatial and contextual differences in urban and rural settings (Heeks, 2008; Steyn & Johanson, 2011; Tongia & Subrahmanian, 2006). This often results in the creation and development of unusable services and products that do not add value or improve the quality of life in rural areas. The advantage of the Living Lab model is that user specifications are factored in through collaborative ICT design and development, and this ensures that relevant products and services are designed for rural contexts.

Within the Living Lab model, the products which are designed should be tied to long-term, national development goals (Unwin, 2009); hence the role of the government as the sector responsible for national policy making is highly embraced. Furthermore, the government already has a mandate to deliver basic services to citizenry, and this model can create, through collaborative relationships, an environment suitable for improvement of service delivery (Hecita, 2009; Zambrano et al., 2009). The products which are designed and developed in this partnership, can improve service delivery, as well as communication and information flow between the government and the citizens, an example of which is e-government. The role of government in this partnership is imperative, not only for creating an environment suitable for implementation and engagement of ICT through policy making, but also in governing how such ICTs are integrated. This can be ensured through comprehensive, relevant policy making and effective policy practice.

The role of communities in this collaborative environment is not only to provide informative ideas during the co-design, co-creation and validation processes, but also to ensure sustainability of the products and services by taking up the responsibility of ownership of the projects. Research has proven that a lack of participatory strategies lead to the inability to take ownership on the local communities' side, hence the high risk of interventions falling apart even before they take-off (Gurstein, 2006; Merritt, 2012). While it is common practice in rural development projects to include the local people, the opposite is the case when it comes to development projects that utilise ICT. Hence, participation of primary users is a crucial element of the Living Lab model.

Lastly, because, as indicated early, the immediate problem in the engagement of ICT in rural development projects is that of cost, private organisations play the role of financing such initiatives in the Living Lab model. The difference with this model, however, is that these private organisations are not only coming in their capacity as funders but also as long-term partners. That is, the idea is to have them provide funds to enable long-term service provision to rural communities, from which they, as private organisations, can also benefit. If the company is interested in providing ICT services that enable health care monitoring, for example, then, it can provide financial means to set up the necessary infrastructure and make profits from costing on-going services to community members. According to Pigato (2001, p. 3), studies have shown that even in rural communities, less privileged people are willing to pay a small amount to get the services they need in their own local communities. Also, private organisations are open to supporting community development activities in exchange for reduction of taxes, marketing and advertising, as well as expanding their markets.

The Case of the Siyakhula Living Lab (SLL)

The SLL was initiated in 2006, as a joint venture of the Telkom Centres of Excellence at the Universities of Fort Hare and Rhodes, as well as rural communities in collaboration with the private sector and the government. The SLL is based in the Mbashe Municipality of the Eastern Cape Province of South Africa. The state of education in this region is no different from many of the rural regions in South Africa, in fact, in most African countries. The quality of education and students' performance are compromised by a lack of resources, including learning materials and equipment, teachers and relevant technology. Because of the physical isolation of these schools, simple logistics such as the delivery of textbooks are often compromised; schools receive books much later than the time they order them. When the books are delivered to the Department of Education (DoE) in the nearest town, the schools authorities still have to travel long distances to collect them (Pade-Khene, 2012, p. 48). The nearest town where the DoE office is – Idutywa – is about 73km from the Dwesa region, on gravel road. Hence, there was a need for intervention of the private sector, academic institutions and the government. These sectors together with the communities in the Dwesa region – and later the Mbashe municipal area – formed the SLL, which would work towards enhancing information distribution and innovative development in these communities.

'Siyakhula' is a Xhosa word that means 'we are growing'. The name Siyakhula resonates with the objective of the project, as it aims to grow sustainably in innovation (Pade-Khene et al., 2010b, p. 598). This initiative was started with the aim of enhancing innovative development in the affected communities. Some of the areas of development included information distribution and improvement of communication between these communities and other sectors in society. This would, in essence, encourage participation of rural communities in the affairs of their own development in the information era. The idea of ICT engagement in the given communities was inspired by the realisation that rural communities are often excluded from the global knowledge economy, yet they do have potential as emerging markets, particularly in developing countries (Dalvit et al., 2007; Gumbo et al., 2012; Siebörger & Terzoli, 2010; Thinyane et al., 2007).

When it started in 2006, the SLL was set up at the five schools situated within the Dwesa-Cwebe area in the Mbashe municipal area. These schools are: Nondobo, Mpume, Ngwane, Mtokwane, and Nqabara. The project later expanded to include other communities within the Mbashe Municipal area, and is now hosted by a total of eleven schools (Dalvit et al., 2012). The initiative aims to empower the communities with appropriate innovations and services to actively participate in development activities. The students in the schools are mainly targeted as users, in an effort to improve their access to information and the quality of their education.

The SLL exists as a collaborative initiative involving the four main sectors – the government, academia, communities and the private sector – in their attempt to develop and deploy innovative solutions that can better serve the communities, including the schools within these communities. Desktop computers and wireless network have been provided to the schools through the collaboration of the four main stakeholders. Through this initiative, users have an opportunity to participate and influence the design and development of innovative products (Gumbo et al., 2012). This means therefore that, ICT applications which are developed to aid teaching and learning in schools, such as e-learning, are able to capture user-specifications as a result of effective engagement of primary users. These primary users also have the opportunity to interact with the products from the very early stage, which can help to lessen the complications that come with using unfamiliar products.

Findings of the Research and Discussions

The research explored the potential and reality of the Living Lab model in a specified case study, and this included looking at its impact and potential on a wide range of development aspects including social, economic, governance and of course education. For the purposes of this paper, the only findings which will be discussed are those relating to education. Since its inception sixteen schools have been equipped with computers and network access. This enables the learners to have access to information without having to solely depend on printed material. Because it would have been difficult, possibly even unrealistic, for these rural schools to afford computers, not to mention the Internet provision, collaboration with other sectors has addressed the issue of the lack of resources. However, as will be reflected in the shortcomings, learners' access to these computers has not gone without constraints.

Also, it was indicated earlier that one of the challenging factors of ICT engagement in rural schools is that in some cases the teachers themselves do not know how to use computers, this was the case in the studied schools. Through the SLL, the teachers in these schools have been provided with computer skills through the Advanced Certificate Education (ACE) program specialising in ICT. This program has been facilitated by Rhodes University, and to this far over twenty teachers have benefited from this program. These teachers can now transfer their skills to their learners, which serves to improve the relevance of rural education for the increasingly digital work environment in the information society. The knowledge-based economy in the information era requires that people efficiently learn new skills within a short space of time (Zhang et al., 2004, p. 75), hence it is essential for education in rural schools to keep up with the time.

Furthermore, through collaboration with academic institutions and the private sector, the strides have been made to develop applications that will enhance the use of ICT for effective, innovative learning. An example is the e-learning platform which has been developed and will be deployed in these schools in the future. Through interaction with learners and other community members, researchers were able to solicit and capture user requirements in the design and development of this application. For example, the language of preference, the types of materials users would like to have access to, etc. Interactions with users occur through arranged meetings as well as through their regular visits and use of the available computer labs, where researchers from Rhodes University and Fort Hare get to meet with them.

The developed e-learning platform will enable learners to interact with their peers and teachers instantly and at any time. Furthermore, learners will have access to more diversified information, which will possibly improve their ability to analyse and synthesise information for better knowledge gain. While e-learning does not replace classroom learning, it certainly enhances the methods of learning as it transcends the limiting walls of the classroom environment, and exposes learners to multiple opportunities of acquiring information and knowledge (Zhang et al., 2004).

The Shortcomings of the Siyakhula Living Lab (SLL)

While the idea of the Living Lab model is so comprehensive, it does not go without any limitations. The SLL also has its own specific shortcomings. Even after many years of its life, the challenge of the initiative is that of a lack of political will and continuous commitment from other partners – private organisations and the government to be specific (Mosuoe, 2013). The aim of the model is to ensure that all partners collaborate effectively, yet it is clear that private organisations, for example, see themselves only as funders instead of long-term partners in the SLL. Evidently, there is a missing link in terms of establishing how these companies or organisations can launch long-term service provision that can enable them to earn returns on a continuing basis, while at the same time serving the needs of the communities. Furthermore, the government is still reluctant to go beyond research funding and policy making, to engaging the potential ICTs in their on-going service delivery (Mosuoe, 2013).

Moreover, national level policies have also proved, ironically, to be one of the constraining factors to the engagement of ICT for teaching and learning in the studied schools. One of the findings in this research is that in previous years, computer literacy was one of the subjects taught at the studied schools, subsequent to the provision of computers through collaboration with private organisations. However, since 2012 the learners have not been able to have computer literacy classes or use computers, as the Department of Education ruled against it on the basis that it is not included in the curriculum (Mosuoe, 2013). This goes to show that the use of ICT for development is not only a question of availability of technology, but also of active buy-in from all relevant sectors, particularly the government as the regulating entity.

However, there is hope that the current situation will be improved in the near future. During the launch of the expanded part of the SLL in 2013, the senior educational officer based at the Department of Education in Idutywa said in her own words; "…we as the department are working on, and are now very close to including ICT in the educational curriculum…the aim of the government is to produce 'digital-wise' generations for the information society." The SLL is already a step ahead in ensuring that this vision of the government becomes a reality, by providing the Internet and computers to the schools in rural communities (Mosuoe, 2013). Furthermore, the initiative ensures that technologies are developed and deployed in an effective, sustainable manner, in order to transform education in a long-term.

One of the shortcomings of the Living Lab model, which is not only applicable to the SLL, is that the very same aspect of the model – stakeholder collaboration – may be an inhibiting factor if careful considerations and compromises are not embraced throughout the planning, implementation and evaluation stages of initiatives. Because different stakeholders have different interests and ideas of how the same objective may be achieved, such differences predispose initiatives to conflicts and sometimes divisions (Pade-Khene et al., 2013). This, therefore, means that if collaborative efforts are to be successful, all stakeholders need to be aware of this fact and be intentional about reaching and welcoming healthy compromises.

The Investigative Methods

The research that informed this paper was carried out in the Dwesa region of the Eastern Cape Province of South Africa. Although the SLL has now expanded beyond the Dwesa region to other community schools in the Mbashe municipal area, this particular research was constrained to the four schools in the Dwesa Cwebe area – Ngwane, Lurwayizo, Nqabara, and Nondobo. The research used a combination of both qualitative and quantitative approaches to research. Qualitative methods – interviews and focus group discussions – were used as the methods of data collection in a case study as a qualitative inquiry. A survey using questionnaires, and documents review were adopted as the methods of data collection in a quantitative inquiry.

A case study was undertaken over a period of one year. This case study was structured into three phases; the orientation and overview, the focused exploration, and the member checking phases (Pickard, 2007). During the initial phase, field work was undertaken mainly to familiarise with the study site, build a rapport with community members, as well as to identify potential respondents. In the second phase – focused exploration – potential participants had been identified, interview guides had been designed, the interview schedule had been drawn, appointments with respondents were arranged and data was collected through interviews. Different interview guides were designed for different categories of respondents; teachers, learners, researchers from the two universities involved – Rhodes and Fort hare – as well as other community members who participate in the SLL. Then the last phase – member checking – involved focus group discussions with different categories of respondents to bring in a collective conversation with respondents as fieldwork was coming to an end. A survey was also carried out as the last exercise in the data collection process, to gather more structured data for quantitative analysis. Relevant documents relating to the SLL were reviewed throughout the study.

Quantitative data was analysed using the Statistical Package for Social Scientists (SPSS). Data from the survey was coded then captured into the SPSS spreadsheet and analysed quantitatively. Coding is a process of assigning numerical meanings to the variables in order to make them machine readable (de Vos et al., 2005). Qualitative data was analysed through content analysis. Data from the interviews and focus group discussions was analysed qualitatively, taking note of statements, anecdotes and examples relevant to the research objectives (Mosuoe, 2013, p. 116).

Suggestions for Future Research

As mentioned earlier, this research did not only focus on the education aspect of the impact of the SLL, hence the subject was not fully explored. It would be necessary to assess the impact of the engagement of ICT on teaching and learning in the selected rural schools. Such as comparing pass rates before and after consistent engagement of ICT in the selected schools. This may go to as far as assessing creativity and analytic ability of learners after consistent exposure to ICT teaching and learning methods.

Conclusion

This paper discussed the South African state of education, noting some of the challenges that affect the quality of education in the country. It reflected that the problems in the educational system are not mainly financial but include administration and policy implementation. It reflects that the problems of education are often multidimensional and, therefore, requires complex strategies and measures to address. It further showed that as a result of the challenges faced by the educational system in South Africa, it remains that education fails to keep up with the progressively digital work environment in the information age. The paper also highlighted the significance of ensuring not just accessibility and affordability of education, but also the quality and the sustainability of it, as well as its relevance in the digital age. While there have been efforts to integrate

ICT in education, it remains evident that there are a number of barriers that inhibit the success of ICT engagement processes, particularly in rural areas. The paper, therefore, highlighted some of the barriers to use of ICT in rural areas. It consequently discussed the Living Lab model as an alternative approach that can effectively address some of the challenges of ICT engagement in rural settings. The paper took into account the case of the SLL as an example of the initiatives that engage this model. It shows how teaching and learning can be improved by the engagement of ICT using the Living Lab model.

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