

# ICT in Rural Areas in South Africa: Various Case Studies

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## Abstract

The primary aim of this study is to indicate what has been done about ICT implementation in rural areas in South Africa by investigating various case studies like the SchoolNet programme in Mpumalanga Province and a possible web portal for rural schools. Rural schools and some communities currently lack access to quality education and resources that their urban counterparts consider basic.

## Introduction

Many of South Africa's rural areas exist below subsistence levels and remain impoverished because they have no access to basic infrastructure essential for economic growth and development. As a consequence the youth are leaving their rural homes in pursuit of employment opportunity in the cities (Acacia, 2000, p. 2).

Basic Infrastructure such as electrical reticulation and communications, essential pillars for economic growth, has not even been planned for many deep rural communities in South Africa. Geographic location should not place limitations on access to information and the use of the Internet, which are considered vital to the promotion of learning, training and business development in developing communities (Costello. 2000, p. 2).

Development of the local economy in rural South Africa, and Africa in general, is severely compromised by the lack of infrastructure, services and know-how. This is especially the case for enabling technologies in the Information and Communication arena.

According to Sustainable Villages Africa (2002, p. 1) without electricity, no industrial development beyond cottage industry can be started, and no agricultural activity beyond subsistence can be maintained. Without telecommunications, no current market information is available, and know-how cannot be transferred. Large numbers of the rural population migrating to the urban area of this country seeking job opportunities. Many are forced to return, thereby increasing the pressure on the environmental degradation in the rural areas.

The ICT Research Priorities for the South African National Research Foundation (*Information and Communication Technology*, 2002, p. 1) also stress the convergence of information technology and communication technology to form the new field of information and communication technology (ICT) has had a revolutionary impact on the way we do business, live and learn. This convergence has brought

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about the Information Age, the Knowledge Era, the New Economy and the Information Society - popular concepts in use today.

We are living through this revolution, which brings together people from different environments. In these circumstances, people may learn from one another, but they also need basic access to and understanding of ICT. Not only do people

need to understand the rapid evolution of new information and communication technologies, they also need to keep pace with the rapid changes imposed on the social structure at work, at home, in the classroom and in the entertainment field. It is indeed necessary to shape the South African information society by harnessing the key information and communication technologies and skills required for the socio-economic development of the country. This understanding needs to take shape within the context of the realities of the country in terms of information literacy. Interfaces between technology and society will need to be different, as levels of understanding may be very different from those that occur in other parts of the world. If South Africa does not become a major player in ICT, the country will struggle to compete (James, 2001, p. 3).

ICT can be regarded as both a driver and an enabler. In many of the other NRF focus areas, ICT is treated as an enabler - influencing how things are done - but this focus area considers the aspects of ICT as the driving force for current or future change.

South Africans need to be part of the information society to be globally competitive, play their rightful role in the region and benefit as individuals. Access to information and awareness of the possibilities of the effective use of ICT form part of this initiative. Broader online literacy is required, as ICT is becoming a popular service delivery channel increasingly used by the government, business and financial sectors. It is important to address the growing functional illiteracy that dis-empowers people from living effectively in a modern society, by taking away people's fears of ICT.

In many respects, South Africa can at best be a fast follower in this expansive world of technology. There should be a clear distinction between the need to develop ICT capacity and the need to conduct research in this area. Fostering capacity is as important as conducting research. Many of the issues listed in this focus area can only be addressed effectively through partnerships between the NRF, industry, government and social communities. The main business of the NRF, however, remains the support and promotion of research into these issues, whereas building ICT capacity may be the responsibility of the partner.

Furlonger (2002, p. 2) points out that urban scholars have the advantage of computer centres, Internet access to information, experienced teachers and ample sporting and cultural facilities to choose from. Rural scholars have no textbooks, writing paper, desks, electricity or even toilets. Research shows that 50% of schoolchildren drop out before high school, mostly in rural areas. With little or no command of English - the language they are expected to switch to in Grade 5 - their cause is nearly impossible.

Rural schools presently face many challenges that are foreign to their urban counterparts. There is a worrying increase in the gap between rural schools and their urban counterparts when it comes to access to good quality education. According to Naidoo (2002, p. 1), research has shown that rural scholars lag up to seven years behind their urban counterparts in basic skills like reading and writing.

## **Drawbacks Encountered in Uplifting Rural Schools**

There are three types of drawbacks facing rural schools - *basic*, *communication* and *other* drawbacks.

### ***Basic Drawbacks***

These are problems that urban schools consider basic, while their rural counterparts consider them insurmountable hurdles. These are issues that rural schools need to overcome before any communication facilities and resources can be put in place to improve their access to quality education.

## **Lack of school buildings and stationery**

This is the most basic need when it comes to schooling, because without proper school buildings and stationery it becomes virtually impossible for learners to receive adequate teaching. There are many rural schools that do not have adequate school buildings and stationery for learners to use, because of the partial subsidy the state provides for building costs. The rest of the costs must be borne by the community. Most rural schools reside in areas with extreme poverty and therefore there is unlikely to be extra funds for buildings and resources (Jenkin, 1995, p. 3).

## **Remotely situated rural schools**

The isolation of rural schools from the urban education mainstream is another obstacle to overcome. Most rural schools reside in inaccessible areas, which makes it difficult for resources and facilities to reach them. There are also limited transport resources to these areas, where scholars usually walk long distances to school. When it rains these rural 'gravel' roads become dangerous to travel on and because there are limited communication resources at these rural schools they get left behind and forgotten. This is one of the main drawbacks facing rural schools (Jenkin, 1995, p. 3).

## **Lack of experienced and skilled teachers**

It is no surprise to find that the most experienced and skilled teachers reside in the urban areas. This is largely due to the availability and accessibility of relevant resources and facilities. The disturbing fact is that out of 360 700 educators in South Africa, 70 % of them ply their trade in rural schools. This means that the majority of teachers are operating in less than ideal conditions (M-Web Holdings, 1999, p. 1). The result is that the majority of scholars are receiving education of inferior quality by teachers without the appropriate facilities and resources needed to sufficiently teach (Jenkin, 1995, p. 1).

## ***Communication Drawbacks***

These are problems that rural schools need to overcome if they want to compete both locally and globally. Schools that do not have communication facilities face being left behind in the dark ages (pre computers). If rural schools want to make use of the Internet, chat rooms, bulletin boards and academic web sites then they have no option but to improve their communication facilities to be able to log on to the Internet.

## **Lack of telephone facilities**

Telephone facilities will make it possible for schools in rural areas to keep abreast with the latest developments in the educational field. It will make it possible for schools in rural areas to log on to the Internet and exchange information with their urban counterparts. It will help rural schools improve their access to information and knowledge (Jenkin, 1995, p. 3).

## **Lack of computer hardware and software**

Computers and computer resources are indispensable in the educational and business environment today. It is very difficult for someone who is not computer literate to successfully complete his or her tertiary studies or find gainful employment. Most jobs in the business world require some knowledge of the use of computers and the Internet. According to Furlonger, (2002, p. 2) in most rural schools it is unlikely that you will find a computer lab, yet alone someone with knowledge of the Internet, unlike urban schools. Yet the Internet could be used to bridge the gap between rural and urban schools, through the use of educational web sites and lectures via satellite. The computer and its resources are central to modern education and it's here to stay (Solar Electric Light Fund, 2001, p. 3).

### **Lack of technical training**

Many schools in rural areas lack teachers with appropriate technical skills and experience in key subjects like computer literacy and Internet usage. This results in most rural schools not being able to offer computer courses, resulting in rural scholars not being adequately prepared for tertiary studies where computers and the Internet knowledge are indispensable. This makes the gap between rural scholars and their urban counterparts all the much greater when competing for tertiary positions (Jenkin, 1995, p. 3).

### **Other Drawbacks**

These are other issues that will hinder rural schools bridging the education divide between themselves and urban schools. They are secondary problems that rural schools need to master before they can be judged equally with schools in urban areas.

### **Lack of library facilities**

The library is a common resource in most urban schools and areas. According to Burnett (1999, p. 3), most rural communities do not even know what a library is yet alone what its function is. Establishing a library in schools in rural areas will help improve the illiteracy rate and enhance rural education. These libraries can eventually evolve to include computers to help train scholars in computer literacy.

### **Lack of transport facilities**

According to Jenkin (1995, p. 3), it is not uncommon for scholars to walk long distances to school in rural areas. Giving rural scholars access to transport resources will motivate them to attend school as a large majority of them walk long distances to school everyday in all kinds of weather. This is largely due to poverty, limited schools available in rural areas and lack of appropriate transport facilities. These are just some of the main reasons why there are a large number of children who do not attend school in rural areas (Jenkin, 1995, p. 2).

### **Large student to teacher ratio**

According to Jenkin (1995, p. 2), it is not uncommon for schools in rural areas to have class sizes of up to 70 scholars to a teacher. This is also a problem in some urban 'government' schools, where they too have high scholars to teacher ratios. This results in the weaker scholars in the class not getting the necessary attention that is needed, since the teacher has so many scholars to attend to. Jenkin (1995, p. 3) also asserts that the drop out and repetition rates in rural schools are very high.

## **Possible Solutions in Uplifting Rural Schools**

A rural solution in uplifting rural schools is a solution that results in positive changes and conditions in rural schools. It is a solution that must produce positive results for rural schools and their communities.

### ***Learn -O- Vision***

According to Callaghan (1999, p. 2), the Learn-O-Vision was developed by D. Oosthuizen to provide rural schools with all the facilities of a first-rate educational institution. The concept of Learn -O- Vision was conceived while Oosthuizen was watching the news where he saw a Garankuwa school with no classrooms and teaching happening under a tree. He states that with the Learn -O- Vision there is no reason to have disadvantaged scholars.

The Learn-O-Vision offers teaching staff a solar-powered computer system, television, video machine, writing and flannel board in a portable and secure box. The complete Learn-O-Vision unit is housed in

a standard wardrobe-sized box on wheels and it has front flaps that open out and acts as the writing board with the video machine and television in front. The computer sits at the back of the unit and works with battery power that beeps for 10 seconds if you forget to switch it off. The unit has two solar panels, which provides power to the batteries. When fully charged these batteries have enough power to last a full school day and as an alternative it can work with electricity mains. Wheeling and locking the unit in a secure room at the end of the day can overcome the security issue (Callaghan, 1999, p. 4).

According to Callaghan (1999, p. 6), the Learn-O-Vision unit will eventually evolve to give rural schools access to the Internet and make distance education possible. Rural schools will be able to view educational tapes on the video machine and watch academic programs on the television. The units' flannel boards will be used as a writing board. This unit has many benefits and possibilities that can assist in bringing quality education to rural scholars.

### ***Biogas Project***

According to Myeka High School Biogas Programme (Maphephetheni 2001, p. 2), the biogas energy is created by the use of a major resource that is readily available and that is human excrement. The excrement is used to drive a generator, which in turn delivers electrical energy. This energy is used to supplement Myeka High School's already existing solar power (Maphephetheni 2001, p. 3) and also provide energy to the surrounding community at a later stage.

Myeka High School Biogas Programme (Maphephetheni 2001, p. 2) asserts that the school currently needs about 20 kWh per day. The solar power project already provides about 12 kWh per day, while the biogas project should provide about 15 kWh per day and that is a conservative estimate. Another approach estimates about 22 kWh per day is produced by the biogas project. This illustrates that the two projects working in conjunction should yield sufficient energy for the school and maybe if extended to the surrounding community should create enough energy for the community as well. According to Myeka High School Biogas Programme (Maphephetheni 2001, p. 5), the main goal is to establish a working example of providing electrical and thermal energy to a rural school, using gas generated from the anaerobic digestion of human excrement.

This biogas project will result in a three-fold solution for rural schools. It will provide electricity for the schools, it will provide sanitation resources and it will provide fertilisers to be used in the communities. This solution will make it possible for rural schools to operate efficiently with the limited funds they receive and it will also assist in providing quality education to rural scholars.

### ***SchoolNet in South Africa***

South African schools, information technology and the Internet have taken a giant step forward with the establishment of SchoolNet SA - the national body that will coordinate the linking of South African schools to the Internet (*Schools networking*, 1997, p. 8).

Since the establishment of SchoolNet South Africa (SNSA), it has become an important critical partner in South African Education System. The strength of SNSA lies in its vision - using ICT to support education and training (*Schools networking*, 1997, p. 4).

“Educators are constantly trying to understand educational process and must make professional decisions that have immediate and long-range effect on others: students, teachers, parents, and, ultimately, our communities and nation” (McMillan & Schumacher, 1993, p. 26).

South Africa is regarded to be one of the developing countries in the world and it has touched the heart of the World Bank. The World Bank targeted disadvantaged schools in the country for computer access. “The World Bank is working with various IT companies, some of whom made quite meaningful. Con-

tributions in donating computing equipment, and providing technical and training support” (Hawkins, 1999, p. 3).

SNSA has its aim to influence all levels to create the awareness for the widespread use and implementation of the Internet and computers into schools. The purpose of this study is to evaluate the effectiveness of SNSA for disadvantaged primary schools in the Mpumalanga Province.

## **The Effectiveness of SNSA and Educational Technology**

It is true in general, but especially true in education, that technology touches our lives more and more. Technological innovations may change many of the roles of educators, but some of their roles will always remain the same. From an economic standpoint, almost all working adults are required to use some sort of technology in their jobs. Learners who are more comfortable around computers and new technology in general will be more productive workers. From an academic standpoint, technology can assist in education many concepts (Lawrence, 2001, p. 4).

SNSA lies on its vision to promote and implement ICT in schools. While SchoolNet’s primary objective is to develop a national educational network which forms the knowledge backbone of the country’s information highway, the key values of the organization will focus around the core principles of access, equity, constructive partnerships and ownership of ICT for South African schools, especially those from more disadvantaged and rural areas. Through this program they can explore new applications and become used to using ICT’s in their daily learning environment (Brandjes, 1999, p. 6).

## ***The Needs of Disadvantaged Schools and Their Status of Technology***

Some researchers have found that South Africa is one of the developing countries in the world. The past (racial inequities, crime and apartheid) still haunts our country. The needs of disadvantaged schools in South Africa is often underestimated. According to Arif (2001, p. 4) the meaning of disadvantaged here implies limited or no access to basic resources that are taken for granted in the developed world. Rogers (2002, p. 3) enumerated the needs as follows:

- Schools need to be closer. Children walk kilometers to school everyday in all sorts of conditions.
- More school buildings. Children attend a class that is overcrowded.
- Learning materials. There is a lacking of textbooks, exercise books, and basic writing materials.
- When it comes to technology the educator is often barely literate herself.
- Disadvantaged schools have the need to access electricity, phone lines, money and technology is still at its latent stage.

Greenstein (2001, p. 6) states that the education sector is potentially one of the most beneficiaries of the use of ICT. The use of the Internet in teaching and networking in schools in developing countries is still in its latent stages (Econews, 1999, p. 5). When new technologies are brought into existence into this state of affairs the temptation is to see in them an important step forward regardless of the actual value they add to the educational process.

According to Greenstein (2001, p. 8), this is a general problem that can be identified in the use of ICT in the education sector:

- There are few links between education at different levels: primary, secondary, tertiary. Especially in areas where universities are functioning it is important to develop links across levels to enable much large number of people to take advantage of the relatively well-resourced academic institutions with better- developed material and network infrastructure.

ICT is in the fight against poverty Rugunda (2001, p. 2) enumerated the following examples of how ICT has involved itself into working for the disadvantaged area:

- **Education and Academic** – Use the Internet in schools and teaching.

It has been found that other educators would like SNSA to be known to other schools in Mpumalanga Province in South Africa. It has also been found that there are not enough workshops for educators on how to utilize the benefits of SNSA.

This is supported buy the literature, which also indicated that SNSA seeks to promote and implement ICT in schools (Stephen, 1999:4).

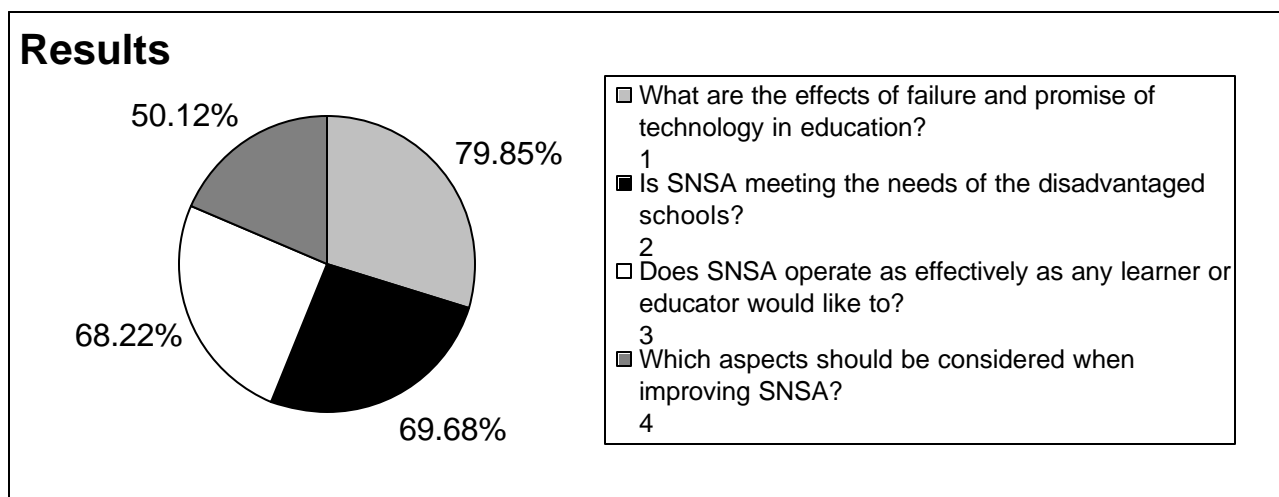


Figure 1: Results of the SchoolNet programme in Mpumalanga

## Recommendations

Based on the above findings, the following recommendations can be made:

- Provide funding to meet costs of upgrading electrical services to schools
- Training for educators to understand the kind of software or educational programs to purchase to enlarge to their traditional method of educating.
- Training educators on how to use the technology and what is known as how to integrate it into the curriculum.
- Create educational network, which provides disadvantaged schools with Internet access at low cost and high performance.
  - A network of schools should be established making use of the Internet, enough computer equipment should be provided and other educational software.
- Extend the use on SNSA so that every disadvantaged school in the Mpumalanga Province can have the advantages it brings.
- Educators development is necessary to help educators better define the following:
  - What it means to have technology at school.
  - How SNSA can help struggling learners to improve academically.
  - How can an educator benefit from SNSA

- School schedules should be reviewed to determine how educators could be provided with more time to prepare schoolwork with the Internet.
- Workshops for educators in all schools using SNSA to empower each other with their performance.
  - Educators who understand that learning in the twenty first century is not just a matter of mastering a fixed body of knowledge, but also being able to discover the rapidly changing ideas about knowledge itself are needed.
  - We need educators who are able and willing to become parallel with their learners, educators who are not afraid to acknowledge.

## ***Internet Background***

According to Laudon, Traver and Laudon (1995, p. 138), the Internet is one of the best-known wide area networks (WAN), spanning the globe. It is made up of thousands of smaller networks and users across the world with no central office to control it, making it impossible to attack.

The Internet also known as the “*information highway*” began around 1969 as a government sponsored network called ARPANET (Advanced Research Projects Agency Network). It was used for the sole purpose of linking government research centres with university researchers. Eventually, establishing the Internet protocols TCP/IP, which we still use today. The Internet however only exploded in terms of growth in the 1980’s, when a number of public and private networks joined in like colleges, businesses and agencies. (Meyer & Baber, 1995, p. 248)

Below are some of The Internet resources that will be used on the educational web site prototype.

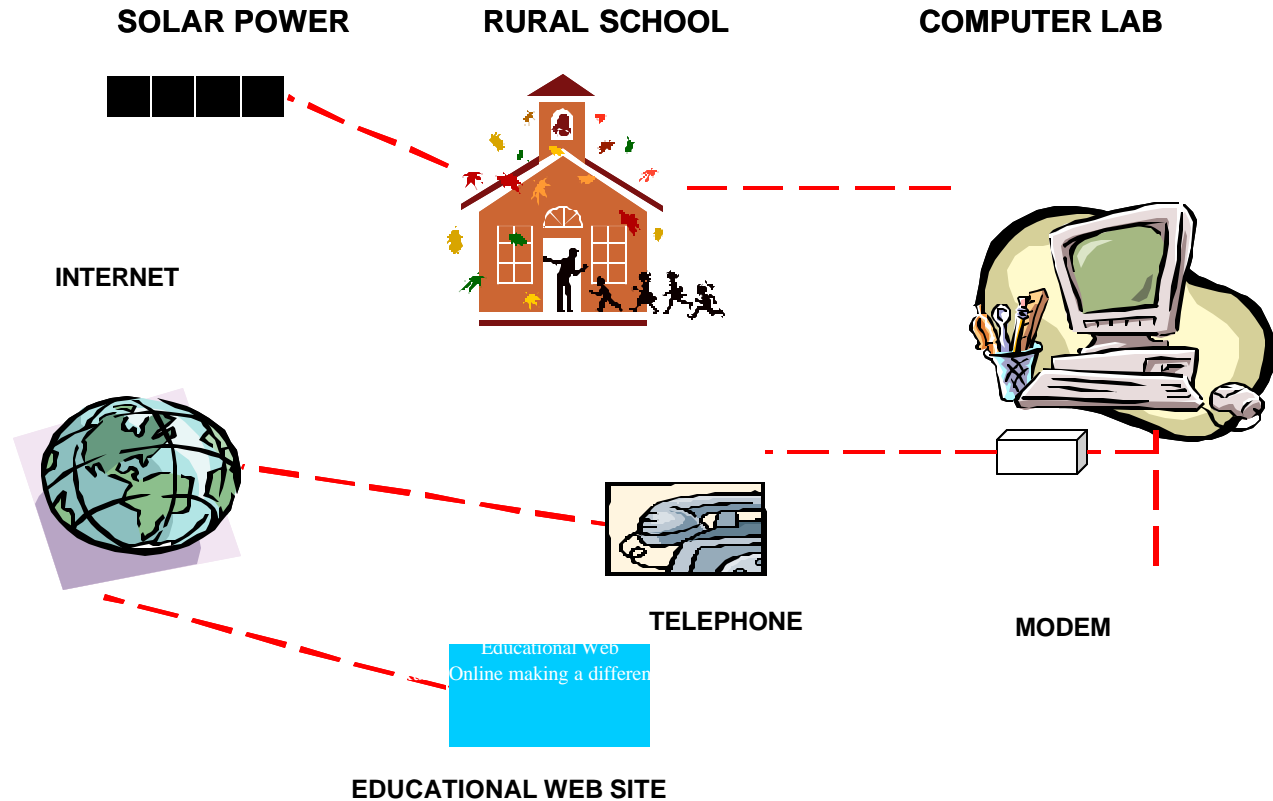
- Electronic mail – Email is used to send messages with graphics and text to anyone with an Internet address worldwide.
- Chat groups and Study groups – Discussions on a variety of topics can be undertaken on the Internet, with other users.
- Noticeboard – Information on a variety of subjects can be posted for others to view.
- Search options – The search function is used to find all information on a specific subject that you are looking for.
- Educational based information – Any relevant educational information can be posted on the web site for all scholars to have access to. (i.e. old exam papers, syllabus)
- Tutors – Scholars will have access to someone or a facility that can help them with FAQ (frequently asked questions) or academic related problems.
- Library Material Online – All syllabus books will be accessible from the web site and the scholars will be able to view them online.

## ***Prototype Topology***

Figure 2 shows the topology of the educational web site prototype.

It is important that rural school education become a priority in South Africa because they are getting further and further away from their urban counterparts in terms of access to quality education and resources. This results in rural scholars not being adequately prepared for life after school whether it is employment or tertiary education.





**Figure 2: Topology of the educational web site prototype.**

## Conclusion

Findings indicated that effective use of SNSA is necessary at all levels in order to ensure a better education for the success of the learners and development of educators. Technology on its own is neither an advantage nor disadvantage. People and how they use technology gives it an advantage or a disadvantage. From this viewpoint SNSA has a great impact on disadvantaged schools. It is trusted that this study of value particularly to disadvantaged primary schools and the various Department of Education, Institute for Communication and Development (IICD) and Center of Educational Technology and Distance Education (CETDE) with regard to enhance education.

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## Biography

**Prof ME HERSELMAN** is the Research Professor: Faculty of ICT at Technikon Pretoria. In this position she assists lecturers and post-graduate students with their research projects, NRF projects, articles and other research related activities. Since 1997 she has published several articles in various national and international journals and has presented papers at several international conferences. She has also been the team leader in a team research project in writing of a technical report funded by the NRF. Currently she has two NRF funded research projects and assists over 50 postgraduate students with their research projects. Her master's and doctoral students work on industry related projects especially focusing on ICT provision in disadvantaged communities in SA. Her field of expertise: All aspects of ICT in rural areas and HEI in South Africa.