The Attitudes And Self-Reported Competencies Of Educators In Rural Schools Of KwaZulu-Natal Regarding The Use Of Information Communication Technology To Deliver E-Education To Rural Communities

By

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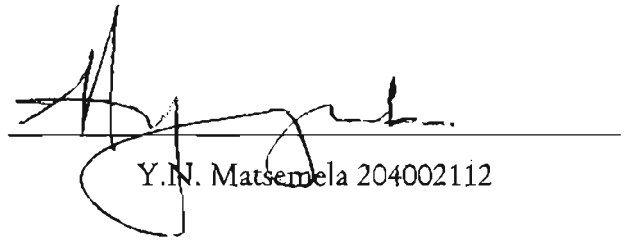
STATEMENT

With the signature below I, Yvonne Nonhlanhla Matsemela, hereby declare that the work that I present in this thesis is based on my own research, and that I have not submitted this thesis to any other institution of higher education to obtain an academic qualification.



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ABSTRACT

THE ATTITUDES AND SELF-REPORTED COMPETENCIES OF EDUCATORS IN RURAL SCHOOLS OF KWAZULU–NATAL REGARDING THE USE OF INFORMATION COMMUNICATION TECHNOLOGY TO DELIVER E–EDUCATION TO RURAL COMMUNITIES

Yvonne Nonhlanhla Matsemela

In 2004 the South African Department of Education released a White Paper on e-Education in which it outlined its intention to introduce Information Communication Technology (ICT) to deliver e-Education in South African schools by 2013. The White Paper prompted this study on the attitudes, perceptions and competencies of educators in rural schools of KwaZulu-Natal towards this policy with the aim to establish whether they would be willing to adopt e-Education and whether they would be ready to implement the policy in the classroom. A study of educators' perceptions about e-Education and their willingness to adopt this form of education delivery enables one to establish their level of e-Readiness.

The researcher conducted a literature review and formulated e-Readiness as the theoretical framework of the study. This was followed by a quantitative research involving a suitably representative sample of educators in rural schools of KZN. It aimed at establishing educators' use of basic and advanced electronic communication technologies as indicative of e-Readiness. A follow-up survey was conducted which intended to establish educators' use of cell phones as an indication of e-Readiness. Both surveys were conducted by means of structured questionnaires. Data processing and analysis were done using analytical program SPSS 13.

The major findings of this study are that educators in rural schools of KwaZulu-Natal are not ready for the rollout of e-Education. Among the factors limiting their e-Readiness are: a lack of exposure to advanced electronic communication technologies emanating from lack of technological infrastructure as well as resources in the majority of schools in the rural areas. Another factor is inadequate computer skills needed for effective teaching in an e-Education setting. Those with computer training have not been able to utilize their skills at the poorly equipped schools where they teach and would therefore require retraining. The study, however, revealed positive attitudes among educators and willingness to adopt and implement the e-Education policy should these problems be addressed. Finally comparison of the results of PC based e-Education survey and the cell phone survey indicate that while educators in rural communities are ill-equipped to use computers, they are sophisticated cell phone users, leading one to surmise that they would readily adopt emerging and converging technologies that are set to make available powerful multi-functional communication-computation devices.

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ACRONYMS

In this section the researcher defines the key concepts used in this study. Most of them are explained in greater detail n the dissertation.

ATQF: Australian Quality Training Forum

CARET: Centre for Applied Research in Educational Technology

CID: Centre for International Development

CISE: Computer and Information Science and Engineering

CRA: Computing Research Association

DTI: Department of Trade and Industry

EIU: Economist Intelligence Unit

FCC: Federal Communication Commission

FET: Further Education and Training

GCIS: Government Communications and Information Services

GET: General Education and Training

GUSA: Global Universal Service Access

ICTs: Information and Communication Technologies

IDASA: Independent Communications Authority of South Africa

ISP: Internet Service Provider

ITC: Information Technology Centre

ITU: International Telecommunications Union

MMS: Multimedia Message Service

MPCC: Multipurpose Community Centre

NECC: National Educational Computing Conference

NEPAD: New Partnership for Africa's Development

NITF: National Information Technology Forum

NSF: National Science Foundation

OECD: Organization for Economic Cooperation and Development

PIAC: Presidential International Advisory Council

PNC: Presidential National Commission

PPP: Public – Private Partnership

PSTS: Public Switch Telecommunications Service

SAITIS: South African Information Technology Industry Strategy

SIBIS: Statistical Indicators Benchmark to Information Services

SITA: State Information Technology Agency

SMMEs: Small, Medium and Micro Enterprises

TAM: Technology Acceptance Model

TANT: Trans-African Telecommunications Network

USA: Universal Service Access

WTCD: World Telecommunications Development Conference

Chapter 1

STATEMENT OF PROBLEMS AND RESEARCH DESIGN

1.1 INTRODUCTION

In this chapter the researcher will focus on the problem relating to the introduction of e-Education in South African schools as proposed by the government in the White Paper published in 2003. The research will investigate the attitudes and competence of educators regarding the use of Information Communication Technology (ICT) to deliver e-Education in rural schools. The study will also establish the feasibility of this proposal and its role as compared to other modes of education delivery. The researcher will thereafter state the aims of the study and indicate what research methodology will be used to find a solution to these problems.

1.2 STATEMENT OF PROBLEMS

According to Hu *et al.* (2003) the role of Information Technology (IT) in modern education has increased significantly over the past two decades, but resistance to technology remains considerably high. While technology-supported teaching and learning has become increasingly important in education, fostering technology acceptance among educators remains a critical challenge for school administrators, technology advocates and concerned government agencies. This study aims to investigate the attitudes of educators in rural schools towards ICT and their level of acceptance of technology-based education as a means to improve teaching and learning. The study also aims to establish the state of readiness of the educators to embrace ICT and integrate it into their teaching.

According to Demetriadis *et al* (2003) the level of educators' attitudes towards and acceptance of technology may be associated with their levels

of technological competence. The issue of educators' ICT competence as a major factor for integrating technology in teaching is reported in other studies. If teachers are not confident in their ICT competence, their willingness to introduce technology in their classroom may be hampered. Therefore the level of IT training among teachers in the rural schools will also be investigated in this study.

Problem 1: The attitudes and perceptions of educators in the rural schools towards using ICT for e-Education.

This research is a study of human aspect hence the focus on educators .The educators have a role to play in creating opportunities for learners, therefore it is important that they develop positive attitudes towards ICT for the development of effective education and upliftment of the rural communities. However, educators may not embrace this proposed development and its ability to transform education.

Problem 2: The question whether educators are ready for e-Education

One of the main threats that face human beings in general is the fear of change. Educators may find themselves in a position of fear to venture into the unknown. E-Education encourages learner-centred education and educators may view this as a threat to their roles in the classroom and a move to render them redundant.

It is hoped that this study will be able to address this problem, and help to clarify the role of educators as envisaged by the Department of Education. While e-Learning will not replace teachers, it will enhance the quality and reach of their teaching and reduce the time spent on administrative chores. (White Paper on e-Education 2003)

Problem 3: The perceptions of the educators in rural schools towards ICT for e-Education in relation to other modes of education delivery

The main objective for the introduction of e-Education is to transform teaching and learning through ICT. However this may be perceived as an intention to replace the other existing methods of teaching and learning rather than to improve upon them. This research will determine views of rural educators regarding this fact.

Problem 4: Adequate qualifications and skills for educators in rural schools in ICT for e-Education

In order for ICT for e-Education to have the desired impact in transforming education, educators need to be adequately qualified and skilled to create learning programs that will enhance creative thinking and problem-solving skills in learners. Furthermore, adequate knowledge and skills will empower educators and increase their confidence and positive attitude towards e-Education.

Problem 5: Adequate provision of necessary equipment to enable implementation of e-Education in rural schools

In order for the successful implementation of e-Education to achieve the desired goals, the rural schools need to be adequately equipped. The impact of ICT depends on the extent to which the educators and learners have access to hardware, software and connectivity.

This study will establish the extent to which rural schools are equipped and also determine suitable equipment for those schools situated in deep rural areas.

Problem 6: Different perceptions expressed about e-Education by educators from rural schools of KwaZulu-Natal related the demographic differences such as gender, age etc.

The advent of e-Education is going to bring major changes in the South African education scene. Previous researches have shown that demographic factors influence peoples' perceptions and willingness to embrace reforms. This study aims at establishing whether these factors have an impact on how educators view e-Education and the reforms it entails.

Problem 7: Retraining/Training of educators in rural schools

Educators in rural schools will need re/training to enable them to use ICT for e-Education. Many educators grew up in environments with limited electric technology and would therefore find it difficult to adapt to situations where they have to work with ICT. Educators need to be confident in their abilities to deliver effective teaching and learning and therefore adequate training is essential.

1.3 AIMS

The aims of this research are as follows:

Aim 1

To use empirical research to determine the attitudes of educators in rural schools towards the use of ICT to deliver e-Education.

Aim 2

To determine the competencies of educators in rural schools regarding the use of ICT.

Aim 3

To determine the perceptions of educators in rural schools regarding the use of ICT for e-Education in relation to other modes of education delivery.

Aim 4

To determine whether educators in rural schools possess adequate qualifications and skills to enable them to deliver effective teaching in an e-Education setting.

Aim 5

To establish whether rural public schools are adequately equipped to implement e-Education.

Aim 6

To determine whether different perceptions expressed about e-Education by educators from rural public schools of KwaZulu-Natal are related to demographic differences such as gender, age, etc.

Aim 7

To determine what training/retraining educators from rural schools should undergo in order to be ready for the use of ICT for e-Education by 2013, which is the government's target year for implementing e-Education in South Africa?

1.4 INTERIM RESEARCH QUESTIONS

The intention of undertaking this research is to answer the following questions relating to the problem:

Question 1: What are the attitudes of educators in the rural schools towards using ICT for e-Education?

Question 2: Are educators ready to use ICT or they feeling threatened by it?

Question 3: How do educators in rural schools perceive ICT for e-Education in relation to other modes of education delivery?

Question 4: Do educators in rural schools possess adequate qualifications and skills to enable effective teaching in an e-Education setting?

Question 5: Are rural schools adequately equipped to implement e-Education?

Question 6: Could different perceptions expressed about e-Education expressed by educators in rural public schools of KwaZulu-Natal be related to demographic differences such as gender, age, etc. within the sample population?

Question 7: What re/training will educators in rural schools need to undergo to enable them to use ICT for e-Education?

1.5 RESEARCH DESIGN

This research is an empirical investigation using quantitative approach. It involved research by means of a structured questionnaire-based survey of a representative sample of educators in rural schools of KwaZulu-Natal. Data from the KZN Education Management Information (EMIS) unit was used to ensure that the research targeted a representative sample of respondents so that the results would be valid for all rural educators in KZN schools.

Permission was first obtained from the Department of Education Regional Office to gain access to schools. The research supervisor was requested to write the request letter on behalf of the researcher. Other request letters were directed to Principals of schools, their School Management Teams and School Governing Bodies.

Data analysis was done by using analytical program SPSS13. The Pearson Test of Significance was also used to ensure that valid relationships are profiled for further analysis.

1.5.1 Research methodology

This research is of trans-disciplinary nature, combining ICT, Education and Communication Science. Furthermore, it will use quantitative approach. It forms part of the cooperative project during which fellow researchers focused on the particular aspects of the extremely complex problem of determining whether it was feasible to deliver e-Education in South Africa.

Initially the research entailed a literature survey to determine which aspects of the research problem have been researched elsewhere and the applicability of the proposed solutions of such research is for e-Education in South Africa. Due to the coordinated nature of this research some of the literature could coincide. To avoid duplication of literature analysis, an independent literature survey was conducted for this project to ensure that the survey related to the specific problems under investigation. Furthermore, particular references that specifically relate to the focus area of this study were identified.

For the literature survey, electronic reference sources of the University of KwaZulu-Natal, namely NEXUS, SABINET and EBSCO- HOST were used to identify relevant references. The literature survey was followed by an empirical investigation using both quantitative and qualitative approaches. This involved research by means of a structured questionnaire-based survey.

1.5.2 Data collection

Data collection was done by means of a representative sample of educators from rural public schools of KwaZulu-Natal. This enabled the

researcher to compare different respondents in order to determine common trends regarding the problem. Data from the KwaZulu Natal Education Management Information (EMIS) was used to ensure that the research targeted a representative sample of respondents so that the results would be valid for all rural educators in KwaZulu-Natal schools.

The survey involved fieldwork that entailed dissemination of questionnaires. Permission was obtained from the Department of Education Regional office for access to schools. The research supervisor was requested to write this request letter on behalf of the researcher. Other requests were directed to the principals of the targeted schools, their School Management Teams and Governing Bodies.

1.5.3 Data analysis

Data analysis was done by using analytical program SPSS 13. The Pearson Test of Significance was used to ensure that valid relationships are profiled for further analysis.

1.6 OVERVIEW OF DISSERTATION

In this section the researcher gives a preview of the dissertation.

Chapter 1 will provide the route map of this dissertation. It will discuss the statement of problems, aims of the study, interim research questions and research design.

Chapter 2 will provide a review of existing literature to establish the extent to which other authors have managed to address the problems stated in chapter 1. A theoretical framework for interpreting the empirical results will be formulated. This chapter will also confirm the interim questions stated in chapter 1 as the actual questions to be addressed by this study.

Chapter 3 will outline the research methodology to be used in this study to provide answers to research questions. It will also explain the procedures followed in preparation, data collection and processing.

Chapter 4 will provide the presentation and interpretation of data as well as results of the empirical survey.

Chapter 5 will provide answers to critical questions, state limitations and make recommendations on how to address problems that limit the level of e-Readiness of educators in rural schools in relation to the implementation of the e-Education policy.

1.7 CONCLUSION

In this chapter the researcher stated the aims of the study, the critical questions that prompted this research and indicated the research methodology that will be used to find solutions to address these questions. In the next chapter the researcher will present the literature review regarding the research problem.

Chapter 2

LITERATURE SURVEY

2.1 INTRODUCTION

In the previous chapter the researcher outlined the purpose of this study, problems to be investigated and also indicated research methodology that will be used to find solutions. In this chapter the researcher will review existing literature relating to the research problem. The researcher has used electronic reference resources of UKZN. A NEXUS search was conducted to review ongoing and completed dissertations and research reports. It revealed no results. A SABINET search was also conducted to identify relevant books in print which the researcher thereafter acquired through the UKZN Interlending Library facility.

Other search engines such as the Science Direct were also used and several articles, dealing with Technology Acceptance, e-Readiness and Odyssey Project were accessed. The researcher also consulted electronic journals such as the *Journal of the Association for Information Systems, Learning & Leading with Technology, Newsweek* and others. A bird's eye view of the survey can be viewed from the concept matrix which was developed by exploring the abstract, summaries and conclusions of different relevant authors. The concept matrix also consists of a bibliographical listing all material reviewed.

2.2 LITERATURE REGARDING THE MOST APPROPRIATE THEORETICAL FRAMEWORK FOR INTERPRETING THE EMPIRICAL RESULTS

The literature review deals with *e-Readiness* as the theoretical framework of this study, including the relationship between e-Readiness and other major concepts in this study.

2.2.1 Naidoo and Klopper's Framework to determine e-Readiness

According to Naidoo and Klopper (2005) the definitions for e-Readiness vary in scope, depending on the study done. After giving consideration to different definitions by different authors, they conclude that researchers define e-Readiness as the degree to which a society is prepared to participate in the so-called networked world with the underlying concept that the Networked Economy can help to build a better society.

Naidoo and Klopper (2005) present a theoretical framework of factors determining the degree of e-Readiness of emerging societies. According to these authors, this framework is a precursor for a more comprehensive empirical study of e-Readiness in South Africa. They point out that this framework may also be useful for research regarding the degree of e-Readiness of other emerging economies that use ICT to transform their economies.

These authors further indicate that the most prosperous countries in the world have benefited from the technological developments over the last several decades. However, they decry the existing situation whereby only the developed countries are reaping the majority of these gains. This brings out the reality of the digital divide that exists between the rich and the poor countries. ICT is then regarded as the initiative that has the power to transform poor societies through reducing poverty and creating wealth.

2.2.1.1 e-Readiness attributes

Naidoo and Klopper (2005) point out that there are different categorized attributes that have been used as tools for measuring e-Readiness.

- *Networked applications and services* – how to use connectedness to make it meaningful and purposeful
- *Networked Economy* – the role of network in driving the economy
- *Networked World Enablers* (policy, privacy, security and ubiquity) – key levers to expediting the networked world

2.2.1.2 e-Readiness rankings

The Economist Intelligence Unit (2005) has published e-Readiness rankings since 2000. The most recent rankings assessed the countries on their ability to promote and support e-business and ICT services. The Economist Intelligence Unit's 2005 ranking methodology has undergone modification and included criteria that reflect the countries' importance in determining e-Readiness, e.g. broadband access and Internet security as both fast and secure Internet connectivity are proven to be the key enabling qualities of effective business.

They have also refined the measurements of some other aspects of connectivity such as security of Internet services, amount of Gross Domestic Product that goes into ICT spending. Through these innovations they have introduced quantitative measures of entrepreuneship. The six categories and criteria including their weight in the mode introduced by The Economist Intelligence Unit in 2005 are as follows:

- Connectivity and Technology Infrastructure (Weight in overall score: 25%)
- Business Criteria (Weight in overall score: 20%)
- Consumer Business Adoption (Weight in overall score: 20%)
- Legal and policy Environment (Weight in overall score: 15%)
- Social and Cultural Environment (Weight in overall score: 15%)
- Supporting e-Services (Weight in overall score: 5%)

According to these rankings Denmark maintains its first position, due to its superiority in both infrastructure and innovation. It is followed by USA in the second position. Switzerland climbed upward in the rankings and occupied fourth place owing to its steady growth in broadband, which included WiFi as one of the new connectivity categories introduced in 2005 and a healthy ICT investment.

West European countries have dwindled a little because of faster ICT progress of other countries and refinements in the Economist Intelligence Unit's measurement model. The United Kingdom, for instance was second in the 2004 rankings but moved down to fifth position in 2005. Although it continues to enjoy high levels of connectivity and benefits from substantial government commitment to achieving information society objectives, it was weak in the educational area. Naidoo and Klopper (2005) point out that e-Business plays a role in some countries but not enough to transform parts of their economies. Examples of these include India, which occupies 49th position and China at 54thposition. According to the Economist Intelligence Unit (2005) both these countries consume close to one third of the world's ICT investment and both continue to attract the large share of the world's technology-earmarked foreign direct investment. However, both countries do not improve in terms of e-Readiness due to the fact stated by the Economist Intelligence Unit (2005) that the billions of dollars in ICT investment and revenue are tiny compared to their overall economy considering that such ICT usage does not even represent enough of the population penetration.

Naidoo and Klopper (2005) further state that the lack of e-Leadership also affects the e-Readiness positions of some countries. Examples of these are the regional leaders in Central and Eastern Europe and Latin America. In Eastern Europe, Estonia occupies number 26 and in Latin America, Chile occupies number 31. Naidoo and Klopper refer to the Economist Intelligence Unit (2005) which indicates that these countries' markets score higher than the global average in its receptive core compe-

tencies of e-Government and online services. However these countries' markets lack in infrastructure and e-Business adoption.

2.2.1.3 E-Readiness policies

According to Naidoo and Klopper (2005), the development of the framework for the analysis of e-Readiness policy issues first presented in the Economic Forum-SADC report has been the basis for examining key issues with an African perspective and drawing comparisons between NEPAD (New Partnership for Africa's Development) countries. In addition, the template can help policymakers and stakeholders to frame a dialogue on issues that apply to groups of countries at comparative levels so they can learn from relevant experience and best practice. This template is as follows:

- *Widely agreed upon policy recommendation*: description of general consensus on how this issue should be addressed, generally taken from the international perspective.
- *Key proponents of this recommendation*: list of the main institutions and organizations that recommend this agreed position on the issue.
- *Issues affecting applications in developing countries*: explanation of why and the way forward recommended by the general consensus at the international level may prove to be tricky given the ground level realities in the developing countries; the points to demonstrate an understanding of the challenges that developing countries face which can limit their ability to effectively implement this policy recommendation.

Furthermore, Bridges.Org (2005) presents the following summary of the South African e-Readiness policy:

- *ICT regularity framework*: The country has an independent regulator, ICASA and a progressive ICT policy process.

would affect larger portions of the population or were more comprehensive in scope and effect are favoured.

- *Innovation*: New technology and new business models supported by these technologies affect the cost, speed the transparency of service delivery and the final product in ways recently unimaginable. Projects and opportunities that use new technology or have a new model or approach that will yield greater benefits are more favourably assessed.

2.2.1.5 e-Readiness strategies

Naidoo and Klopper (2005) refer to four basic pillars of e-Strategy founded by the International Telecommunications Union (ITU) 2003. These are:

- *Technology implementation*: development of a wide range of technologies, from leading-edge Internet Protocol (IP) infrastructure and multipurpose communications (MCTs) to new applications in the areas of commerce, health, agriculture, government and online security.
- *Capacity building*: enabling local people to develop and manage their own projects though effective human resource development.
- *Policies and strategies*: helping governments draw up and implement policies and legislation conducive to stimulating ICT employment
- *Partnerships/Alliances*: bringing public and private sector partners together to develop projects that benefit all the stakeholders including the community at large.

According to the Southern African Development Community (SADC) e-Readiness Task Force (2002), the relevant and viable strategies and recommendations can only be made with clear understanding of the current realities within each country in respect of ICT infrastructure, policy and regulatory framework, whether ICT is seen to be a national priority, the

diffusion and usage of ICT in all the sectors of the country, the financial sector, education and others.

2.2.1.6 South African e-Readiness view

According to Bridges.Org (2005), South Africa is showing evidence of growth in the e-Commerce sector. They also note that South Africa has shown a commitment towards the integration of ICT as an essential part of the country's economy, social and academic development. South Africa has also begun to introduce legislation that helps rather than hinder growth and access to ICT services. The country has already put in place legislations aimed at facilitating the growth of e-Commerce.

South Africa occupied the 32nd position in 2003 and 2004 rankings. Naidoo and Klopper (2005) point out that this position is indicative of the government's failure to effectively enforce competition in the fixed-line industry. Telkom still enjoys monopoly of the market and after its partial privatization in 2003 it also owns half of Vodacom. This monopoly stifles the potential of broadband and low-cost access.

Naidoo and Klopper (2005) however acknowledge the fact that Internet access is growing steadily in South Africa. There is fierce competition among the American giants Microsoft, IBM and Hewlett-Packard. Also, there are some local IT companies that are growing fast. There is Dimension-Data, which is a software systems integrator and Datatec which is a networking and services group and South Africa's second-largest IT Company. Vosloo (2004) points out a number of issues that need to be addressed in order to improve e-Readiness in South Africa. These are:

- The ICT Industry should be liberalized.
- South Africa should prepare for the rollout of a second national operator.

- Greater telephone and Internet access should be provided to the rural areas through jumpstarting and supporting rural connectivity projects.
- The government should work on ICT cost reduction for the consumer.
- The government should work on universal access and services for the under privileged

2.2.1.7 ICT in South Africa

Vosloo (2004) notes that South Africa has the environment that is conducive to ICT growth. He points out that the country has a progressive ICT policy and legislative process, full functional e-Government and market conditions that are supported by a liberal, free market economic policy. He further illustrates that South Africa, after the 1994 democratic elections, has been faced with the challenge to strike a balance between sustainable economic growth and social empowerment. This challenge has been addressed by several ICT initiatives, one of which is the South African IT Strategy project (SAITIS). SAITIS has been developed by the Department of Trade and Industry, the Department of Communication, private sector and other stakeholders. It has four fundamental objectives: to create a robust, growing, sustainable ICT sector; to increase the use of ICT as an enabler for socio-economic development; to create a knowledgeable and fast growing ICT workforce and to create a world-class culture of ICT innovation. SAITIS provides Internet access to schools, creates an academy of software development training, provides community Internet access points and installs public information stalls for access to government services.

The SAITIS strategy recognizes that the development of a local market could act as a powerful stimulus to the ICT sector and could have substantial socio-economic benefits for other sectors. To do this, the extension of ICT usage needed to take place in four areas - local market development,

applications development, information infrastructure development and achieving ubiquity of access. Naidoo and Klopper (2005) state that according to the Accentive Markle Foundation (AMF 2001), the 1996 Telecommunications Act had an important objective of promoting universal service and affordable provision of telecommunication services. The South African government organized a number of ministerial clusters, which are: Efficient governance, Investment and Employment, Human Resources Development, Poverty Eradication and International Affairs. The development of these structures was to try to control the cross-sector benefits of ICT, to reduce the potential waste of resources and to create reinforcing strategies through coordinated employment of resources, visible sponsorship and wider stakeholders' involvement. However, the AMF concludes that most of the development has been limited to small-scale local projects or within foreign-owned companies.

Naidoo and Klopper (2005) further indicate that South Africa has been able to extend its base of ICT usage with the development of infrastructure, community initiatives and private sector. They contend however that not every citizen is enabled to use ICT because access to technology is only available in the primary urban areas and secondary towns and not in the rural areas. Although ICT in education is improving in some instances, not all schools have infrastructure and computers and even when they do, without maintenance, due to the shortage of IT literate staff to use and maintain them.

Vosloo (2004) refers to two major influences on the South African government policies and programs, including the ICT related programs. These are Batho-Pele and NEPAD. Batho-Pele, which means "People First" in SeSotho is a policy framework and practical implementation strategy that aims to transform the public sector delivery. It consists of a number of principles, two of which are "increased openness and transparency" and provides more and better information". NEPAD is a Pan-African pledge by the African leaders to eradicate poverty in their countries through

sustainable growth and development. Both these policies have identified ICT as a major contributor in achieving their goals.

2.2.2 Other references on e-Readiness

McConnell Institute (2000) describes e-Readiness as a means to measure the capacity of the nations to participate in the digital economy. It is a medium of acquiring an understanding of the work already done in other countries and an indication of the amount of work that is yet to be done in Africa in general and in South Africa in particular. McConnell uses the "broadband access" which is a ranking methodology that accurately reflects and determines e-Readiness of different countries. South Africa is presently ranked number thirty-two in the world. This rating creates an opportunity for the government and private organizations to come together and improve the nation's ability to participate in business economy.

The McConnell Institute (2000) uses the following six attributes as criteria to assess the countries' e-Readiness globally: Connectivity, e-Leadership, Information Security, Human Capital, e-Business Climate and also Public-Private Partnership.

Connectivity: This attribute refers to the ability to exchange information, goods and services with the rest of the world including affordable information and communications. This attribute further addresses availability and reliability of the technological infrastructure. The key elements of this attribute are: -

- Availability of wire lines and wireless communication service, community access centres (free and paid) and networked computers in business, schools and homes
- Affordability and reliability of network access, including cost of service, downtime and the prevalence of sharing access among individuals.

- Underlying infrastructure including the reliability of electrical supply for critical business computer operations and the ease of import and exporting goods and of transporting them within the country.

e-Leadership: The government's most important task in increasing e-Readiness is to create an environment that encourages private sector action while protecting consumers (healthy relations between business and consumer). e-Leadership addresses the scope and nature of the efforts by government and industry to promote the networked world within a country as a regional or global centre in the networked world. The key elements are: -

- Priority given by the government to create e-Society on a national level
- Progress on e-Government, including efforts to automate processes of services to business and citizens electronically
- Quality partnership between business leaders and the government to improve e-Readiness
- Level of effort to promote access for all citizens

Information Security: A vital aspect of e-Readiness is the level of information security that can be assured by an emerging market. Poor protection of intellectual property can stunt the growth of national software development industry. The key elements are as follows: -

- Strength of legal profession and progress in protecting intellectual property rights, especially of software
- Extent of efforts to protect electronic privacy
- Strength and effectiveness of the legal framework to address and prosecute computer crime authorize digital signatures and enable public key infrastructure.

Human Capital: To participate in the networked world, the country needs to develop and retain a strong cadre of skilful managers and technologists. Its key elements are: -

- Quality of and participation levels in the education system with emphasis on efforts to create and support knowledge-based society.
- Penetration of ICT in schools and the ability of educators to teach in accordance with the technologies.
- Culture of local creativity and information sharing within societies.
- Skills and efficiency of the workforce and strength of the effort to retain skilled managers and technologists.

e-Business Climate: e-Business operates in a complex context of regulatory policies and institutional arrangements that set and enforce rules of private action in the competitive market place. The key elements are as follows: -

- Existence of effective competition among communication and information service providers.
- Transparency and predictability of regulatory implementation, openness of government, rule of law and general business risk e.g. political stability, financial soundness etc.
- Ability of the financial systems to support electrical transactions

Public-Private ownership: McConnell Institute (2000) does not regard Public-Private Partnership as an attribute to e-Readiness but believes it is an indicator of likelihood for a country to maintain its position as a leader, improve its stature or fall behind in the race to cyberspace. It identifies the innovative initiatives involving collaborations among the public sector, private industry and non-profit organizations. Partnerships enable a balanced approach towards the technological developments that consider the needs

of multiple stakeholders thus creating a sense of ownership, greater sustainability and improved e Readiness.

The Economist Intelligence Unit (2002) also assesses the level of e-Readiness of the countries globally. They use the following categories as criteria: -

Connectivity and Technology Infrastructure: This category measures access of individuals and business to basic fixed or mobile telephonic services, personal computer, and the Internet. It also measures accessibility, affordability and reliability of service in the telecom market. They use the following key element as indicators: -

- Fixed line penetration
- Broadband penetration
- Mobile phone penetration
- PC penetration
- Quality of Internet connection
- Security of telecom infrastructure

Business Environment: This category evaluates business climate using eight indicators, which are: -

- Strength of the economy
- Political stability
- Regulatory environment
- Taxation
- Competition policy
- Availability of finances
- Quality of infrastructure, and

- Openness to trade and investment

Consumer and Business Adoption: This assesses business practices in each country, and the proportion of retail commerce conducted online. It examines the extent of Internet use to overhaul and automate traditional business processes. It also outlines how the companies are assisted in this effort by the development of logistics and online payment system and the availability of finance and state investment. The key elements are: -

- State spending on information technology in proportion to GDP
- Level of e-Business development
- Degree of online commerce
- Quality of logistics and delivery systems
- Availability of corporate finance

Legal Policy environment: This refers to the country's overall legal framework and specific laws governing Internet use. It outlines how easy it is to register a new business and how strong is protection of private property, particularly intellectual property which can easily fall victim to digital-age piracy. The governments that support the creation of Internet-conducive legal environment, both through policy and investment get high scores. The indicators are as follows: -

- Overall political environment
- Policy towards private property
- Government vision towards digital age advantage
- Government financial support of intellectual infrastructure projects
- Effectiveness of legal framework
- Laws covering the Internet
- Ease of registering new businesses

Social and cultural environment: This ranking considers the basic education and literacy of the population. This is based on the fact that these are pre-conditions for navigating the web. It looks at the experience of the population in using Internet, its receptivity to technology as well as technical skills of the workforce. Seeing that the Internet business involves risk taking, the rankings assess the national proclivity to business innovations and entrepreneurship. The indicators are:

- Level of education and literacy
- Level of Internet literacy and its receptivity
- Degree of entrepreneurship
- Technical skills of the workforce

Supporting e-Services: This considers the availability of e-Business, intermediaries and ancillary services that support industry and business since no business can function without them. It also takes into account whether there are consistent industry-wide technology standards for platforms and programming language. The criteria are as follows: -

- Availability of e-Business consulting and technical support services
- Availability of back-office support
- Industry-wide standards for platform and programming languages.

2.2.2.1 e-Readiness and Technology Acceptance

Hu *et al.* (2003) describe technology acceptance as human attitudes and responses towards Information Technology. They point out that the role of ICT in modern education has increased over the past two decades but recent studies have shown that resistance to the use of technology remains considerably high. The human attitudes and perceptions towards technology and level of technology acceptance is stated as one of the key elements in the criteria used by the Economist Intelligence Unit (2003) in its fourth category to measure the countries' e-Readiness. This category

deals with Social and Cultural Environment and it includes a criterion that looks at the population's experience in using technology and *its receptivity* to it. This ranking considers the population's e-Literacy based on the fact that basic education and literacy are preconditions for navigating the web. Hu *et al.* (2003) maintain that apart from availability of software and hardware, the human factor remains significant in advancing effective delivery of IT based education. Hu *et al.* (2003) refer to the longitudinal study conducted on public school educators in Hong Kong in 2002, using the Technology Acceptance Model (TAM). The TAM is an intention-based theory used to explain different users' technology acceptance across a wide range of technologies, user population and context.

The findings of this research revealed that fostering technology acceptance among individual educators remains a critical challenge facing school administrators, technology advocates and government departments or agencies. According to Hu *et al.* (2003), pervasive technology acceptance by educators is required for realizing the technology-empowered teaching and learning advocated by visionary educators and IT professionals. McConnell Institute (2001) reiterates this fact and explains the importance of human capital as one of the attributes of e-Readiness. Its key element considers the penetration of ICT in schools and the ability of educators to teach in accordance with information technology as one of the key elements to determine the level of the country's e-Readiness.

Demetriadis *et al.* (2003) state that, in many countries, the introduction of Information and Communication Technologies into schools has been praised as a necessary course of action for the qualitative improvement of teaching and learning. It is considered as a necessity premised on economic, social and pedagogical rationale, and many governments have launched major programs and have invested substantial capital to support ICT in education. However, they point out a disappointing phenomenon of teachers do not appear to make effective use of ICT for teaching. Accord-

ing to Demetriadis *et al.* (2003) it seems teachers' attitudes regarding ICT use in schools does not only pose difficulties but it also cancels the learning benefits expected to arise from this instructional reform. Demetriadis *et al.* (2003) suggest that teachers are characterized as techno-phobic regarding the use of ICT and are also resistant to instructional reforms.

Demetriadis *et al.* (2003) further state that the overall picture seems to be that the introduction of ICT in schools, although strongly supported by many governments, has encountered significant problems relating to the attitudes of people who are responsible for its use in the classroom.

2.2.2.2. e-Readiness and the Odyssey Project

According to Demetriadis *et al.* (2003) the Odyssey Project is a teachers' training project, employing a teacher-mentored in-school training approach for the introduction of Information and Communication Technology into the classroom. It was initiated in the US and became popular in many countries around the globe. It is an attempt to address the teachers' attitudes and capabilities towards the use of technology in their teaching activities. They state that many governments have introduced the Odyssey Project with the aim of extending the use of ICT in the curriculum. Of major concern was the fact that the introduction of ICT in schools, although long awaited and strongly supported, still encountered significant problems relating to the attitudes of the people responsible for its use in the classroom.

According to McConnell Institute (2001), one of the attributes of e-Readiness relates to the human capital. This ranking considers the availability of adequately trained personnel that are able to participate in the networked world. Therefore, the efforts to cultivate skilled teachers are continuing around the globe in order to support penetration of ICT into schools. Demetriadis *et al.* (2003) explain that the Odyssey Project consists of a number of subprojects that include installation of computer laboratories, connecting to the Internet, development of educational software and

teacher training. They refer to one of these subprojects:- a teacher-mentored in-school training that has been recently launched by the Aristotle University for schools in Greece. Its objective is to provide basic ICT knowledge, along with advanced training, regarding the instructional use of specific educational software. The teacher mentors are selected and they attend a yearlong course of postgraduate specialization on educational use of ICT. These courses are administered and delivered by participating universities. Subsequently, the teacher mentors are placed in schools that are already equipped with appropriate infrastructure. They work as facilitators, transferring and sharing their expertise. The focus is on acceptance and/or resistance attitudes that teachers develop towards incorporating ICT in their daily practice.

Boss (2002) also says that another type of an Odyssey Project has recently been introduced in America. She states it is an innovative project involving teachers from all over the globe. Boss (2003), further states that this project is a powerful tool to illustrate a powerful theme in education, e.g., the value of technology to enhance and support learning. The Innovative Odyssey Project website was launched in 2002 and is sponsored by Intel Innovation in Education. It showcases different projects from every school day. Although these projects vary widely in terms of the subject matter, learning goals all make effective use of technology to enhance learning. Teachers from all over the world post their projects on the website and they all share their commitment to create active learning environment for learners. Boss (2002) further explains that the project creates an online resource where teachers can learn from each other and novice teachers can get mentorship from their experienced counterparts. Technology use in learning is a unifying thread in the Innovative Odyssey Project but participating teachers vary widely in their own comfort levels with using technology.

2.2.2.3 e-Readiness and the Digital Divide

Bridges.Org (2005) in addressing the issue of accessibility of technology to different communities and societies reveals a wide gap between those who have access to Information and Communications Technology and are using it effectively and those who do not. Bridges.Org (2005) refers to this gap as *the digital divide.* According to the studies conducted by Bridges.Org (2005), the Information and Communication Technologies are increasingly becoming a foundation of the societies and economies. Therefore the digital divide means that the "have-nots" are denied an opportunity to participate in ICT jobs, e-Government, ICT-improved healthcare and ICT enhanced education.

According to the Economic Intelligence Unit (2001) connectivity and availability of infrastructure are indicators of the level of the country's e-Readiness. Accessibility and affordability are the key elements by which this is assessed. According to their ranking criteria, the world economies need to have sound technology infrastructure in order to be full participants in creating and disseminating information.

Hoffman and Novak (1998), state that the digital divide in the United States of America is race based. They state that the key demographic variables like income and level of education between the White Americans and Black Americans drive the policy questions around access. Hoffman and Novak (1998) also raise concerns about this race gap and its envisaged consequences on the American society, that for the freedom of press the Internet may provide, equal opportunities and democratic communication, but only for those with access to it. Furthermore, the American economy may be at risk if a significant segment of its society who are denied equal access to Internet, lacks the technological skills to keep the American firms competitive.

According to Hoffman and Novak (1998), further studies were conducted to investigate the differences between the White Americans and Af-

rican Americans in terms of computer and Internet access. The results have shown that White Americans are more likely than African Americans to have access to a computer at home and at work and African Americans are still more likely to want access. This, according to Hoffman and Novak (1998) may help to explain the recent commercial success of computers priced below one thousand dollars. It also suggests that programs that encourage home computer ownership and the adoption of inexpensive devices that enable Internet access over television should be aggressively pursued, especially for the African Americans.

Warschauer (2003) describes the digital divide as a societal split between those who have access to computers and those who do not. He goes on to say that these disparities are real, both within and among countries. However, Warschauer (2003) raises concern that this simple binary description of digital "haves" and "have-nots" can lead those attempting to deal with these inequalities onto the wrong path. He believes that this line of reasoning may lead some to believe that with the dearth of digital access of nations, communities and individuals can be easily tackled by an infusion of computers and Internet connection. This perspective has been mentioned earlier in this study and is referred to as *technological determinism*. Warschauer (2003) posits a policy that pays attention to the social context in which these technologies are going to be used. He says that the concept digital divide, separating those with access to computers and information technology from those without, is simplistic and can lead to well-meaning but incomplete attempts at solutions based on merely adding technology to a given circumstance.

With reference to Africa, Quaynor (2002) decries the situation that exists in Sub-Saharan Africa relating to access to the Information and Communication Technologies. According to Quaynor (2002), while most advanced societies are currently exploring knowledge services, it is saddening to note that Africa is not participating to any significant degree in this post-developing society evolution. He continues to explain that a recent

study on monitoring the digital divide concludes that progress on narrowing the digital divide in Africa is unsatisfactory. The study also reveals that without further intervention, it could literally take generations before a substantial narrowing of the digital divide takes place.

The e-Africa Commission, in which Quaynor is a Program Commissioner, has revealed an ICT Vision for Africa, which articulates transformation of African societies from a learning society to a wise society in which knowledge products with secured intellectual property are primary inputs of industry. The ICT Vision for Africa is to reveal ICT and Internet in particular as an empowerment tool while reinforcing people as a critical ingredient in the social and economic transformation of the Sub-Saharan region.

The South African government's White Paper on e-Education (2004) explores the digital divide in relation to its impact on education. It states that the ICT has had an impact on the curriculum and delivery and it continues to pose new challenges for education and training systems. These challenges present themselves within the context of globalization and polarization. They are evident in the world where there are increasing disparities between the rich and the poor, among and within nations. The White Paper also points out that the ICT use in Africa recorded a 20% increase in 2002, mostly due to increased usage in the urban areas and countries with a higher GDP per capita. However, it further shows that while 72% of Americans currently use the internet, only 6.4% of South Africans have access to the use of internet.

The Economist Intelligence Unit (2005) however, paints a brighter picture. It states that their 2005 e-Readiness rankings indicate that the gap seems to be narrowing. Many countries are showing signs of improvement even if they do not have all the components that support digital services (complete technology infrastructure, favourable policy, business and social environment) in place. It further states that countries that have all these enablers working in tandem score the highest, but it is also clear that having

one or more of the basics can go a along way. Seen in this light, the Economic Intelligence Unit (2005) therefore argues that the digital divide is not so much chasm between the "haves and the have-nots" as a distinction between the developed market that has embedded e-Business into full economic activities and the developing market that has turned cost advantages to seize the opportunity in specific technology niches.

According to the South African government's White Paper on e-Education (2004) the South African government is addressing the digital divide through the following initiatives:

- The Presidential National Commission on Information Society and Development. The Commission advises the Government on the optimal use of ICT to address South Africa's development challenges and enhance South Africa's global competitiveness.
- The Presidential International Advisory Council on Information Society and Development. Its role is to advise Government on addressing the digital divide. At its second meeting in September 2002, the Advisory Council identified three focus areas for developing ICT: education, health and small, medium and micro enterprises (SMMEs)
- The Electronic Communications and Transaction Act (2002), which calls for the development of a five-year national e-Strategy, that aims to enable and facilitate electronic transactions in the public interests, including the education sector. (White Paper on e-Education, 2004)

Various government departments in support of integrating ICT into teaching and learning have provided other enabling legislative and policy frameworks. The aim of the Education Department is to invest in initiatives to increase access, boost the capacity of managers, teachers and learners, and provide electronic resources of the highest quality.

Dumas (2002), addresses the issue of ICT and gender equity. She says that there is an urgent need to understand the interplay of ICT and the role of women in facilitating social, political and economic development. She believes that challenges, obstacles, solutions and benefits of ICT development with gender equity can inform policymakers to understand ICT diffusion and its benefits to people in the developing countries. She further states that programs that provide women access to technological skills and training should be developed to enable women to participate in economic and educational practices. Therefore women should be encouraged to do computer studies for them to be able to compete equally with their male counterparts in the corporate world and in business.

2.2.2.4 E-Readiness and the Digital Inclusiveness

Likkanen (2002) describes digital inclusiveness as extension of ICT access to all groups of people irrespective of their differences in social and economic status. He states that narrowing the gap between the digital haves and the have-nots is a top priority for European Union policymakers. Likkanen (2002) feels that digital inclusiveness is both a societal objective and economic asset. The European Commission is determined to fight all forms of digital exclusion and believes that the education system should emphasize basic digital skills for all pupils and lifelong learning for all adults. To achieve this goal, Likkanen (2002) posits the following measures:

- Technology should be a tool for boosting Internet, especially in Southern Europe.
- There should be consultation with other countries outside Europe. His concern is that the telecommunications market is becoming a Pan-European market.
- Regulation of Internet: The European Union Commission policy is to limit legislation of Internet to essential principles e.g. taxation, illegal and harmful content junk mail, etc.

- Provision of public services such as education and health online (e-Education and e-Health.) Such online interactivity will lead to increased responsiveness and cost effectiveness. (Likkanen: 2003)

According to McConnell Institute (2001) it is the task of the government to increase its efforts to promote technology access for all its citizens in order to create e-Society at national level. McConnell Institute (2003) further states that the ability of the government to regard this as a national priority and its ability to create quality partnership with business leaders is one of the criteria used in assessing the country's level of e-Readiness.

Guermazi (2003) suggests a paradigm shift for building access to information technology. She states that the unequal distribution of global telecommunication and information resources is likely to prevent all potential users in Southern Africa from having the necessary tools to hook up to information age and engage in ICT enabled networking. She states that, with digital divide looming even larger both within and between countries, new paradigms for building access to underdeveloped countries in Southern Africa need to be developed.

Guermazi (2003) supports the newly proposed Global Universal Service Access (GUSA) regime as an effective global tool to address the provision of ICT in developing countries. GUSA is an international support mechanism to ensure universality to access information and communication resources. The international support mechanism targets countries and areas that are independently unable under normal market conditions to reach these goals. She argues that GUSA involves access to both traditional telecommunications and newer information services and that in this era of convergence of networks and services, developing countries cannot afford to focus on the universal approach of the past. The current policy is also inadequate to respond to the enormous technological needs of the developing countries. Guermazi (2003) goes on to say that the legal foundations of

GUSA are based on the human rights approach. The policy regards the development using ICT as a human right, and that facilitating access to education, health and political participation is crucial in achieving these rights.

According to the InfoDev Report on Equity Issues (2005) there is a need for the ICTs to be used to reach marginalized groups (economic, linguistic, cultural and gender) in order to benefit education. It points that there are critical equity issues related to the uses of ICT in education and there is a danger that this can further marginalize groups already excluded from the existing educational practices and environments. Students with special needs also form one of these marginalized groups. According to the report, there is a rich-documented history from the experiences of the Organization for Economic Cooperation and Development (OECD) countries of what works and what does not work in assisting students with cognitive and physical disabilities. Some of these applications have shown to have positive and important effects on the development of students with great variety of special needs including the blind, deaf and learning-disabled students.

Quaynor (2002) refers to the e-Africa Agenda propagated by the eAfrica Commission on Africa's Digital Rights as a program to facilitate digital inclusiveness. According to Quaynor (2002), the eAfrica Agenda involves defining and developing specific programs in ICT that focus on specific groups of people he refers to as the "groups at risk". These groups include rural communities, urban poor, and women, youth, orphans, senior citizens, street hawkers and small and medium enterprises (SMEs.)

2.2.2.5 e-Readiness and e-Learning

The South African government's White Paper on e-Education (2004) defines e-Learning as learning through the use of Information Communication Technology. It is a flexible learning system using technological resources, tools and applications focusing on interaction among teachers, learners and the technological environment. It involves the use of tele-

communications, CDs, software, Internet and many other forms of media. The White Paper further states that e-Learning focuses on teaching and learning for a new generation of young people who are growing up in a digital world and are comfortable with technology.

According to the Economist Intelligence Unit (2002) the level of e-Readiness of the country is also measured by ability of its population to use technology, which it calls *e-Literacy*. This falls under the social and cultural category of the assessment rankings. According to McConnell Institute (2001) the level of e-Readiness is also measured by the availability of human capital. One of the key elements of this category is penetration of ICT in schools and the ability of teachers to teach in accordance with the technologies. McConnell Institute (2001) further states that this is gaining an appeal in Asia, Africa and Latin America. In these regions the governments are achieving the impact of the extension of technology into the classroom. In these countries students are obliged to get English instruction to help them to gain the competitive edge in the Internet economy. In Jordan, for example, English lessons start in the first grade and computer literacy in the second year of primary schools. Latin America has created IT Parks to enable teachers to gain knowledge and skills to be successful in class.

According to Oyedemi (2005) most African schools strive for universal access to primary education programs and it is of utmost importance that curricula be structured to include basic computer and technical skills. He says that learning experiences in schools should complement those of the industry. Therefore schools should strive to integrate ICT with teaching and learning activities especially in subjects like Mathematics, Science and Economics in order to enable students to participate effectively in the economic activities when they leave school.

The McConnell Institute (2001) further states that in South Africa, School Net SA is another strong partnership that joins the national gov-

ernment departments with the non-governmental organizations and global high-tech companies who are committed to improving technology.

Van Wyk (2007) highlights various projects that have been implemented including networking of schools to bring technology into the classroom. Thutong is one of the initiatives by the South African Department of Education to bring technology into the classroom. The portal (www.thutong.org.za) was started in 2003. It brings together recent news and events in educational circles, curriculum information and teaching and learning material. Van Wyk (2007) states that towards the end of November 2007, there will be moderated discussion forums with curriculum specialists. She points out that the target was to get 15000 Thutong users by 2007; it is currently at 2500. However, she concedes that with more computers in more schools hooked onto the Internet, Thutong should really be able to take off and should be at least three times that much by 2013.

The South African government's White Paper on e-Education (2004) stresses though that e- Learning is not going to replace teachers, but will enhance the quality and reach of their teaching and reduce time spent on administration. It also describes the policy intention for e-Learning, stressing that its objective is not merely to build technical skills, but also to build a digital and information literacy so that all learners become confident and competent in using technology to contribute to an innovative and developing South African society.

2.2.2.6 e-Readiness and the e-Rate

According to Lesoba Consult (2001) the e-Rate is a simple yet effective strategy to provide access to telecommunications and Internet in educational institutions and libraries. The e-Rate deals with the issue of affordability of technology especially among the disadvantaged communities. Affordability also determines the level of e-Readiness of a country. The Economist Intelligence Unit (2001) points out that addressing the issues of connectivity and affordability of technology is an indication that the coun-

try is e-Ready. This includes the cost of service and cooperation between the state and private sector in providing access to technology. The Economist Intelligent Unit further states that the level of state spending on information technology in proportion with the Gross Domestic Product (GDP) is also another attribute that indicates e-Readiness of the country.

The Federal Communication Commission,) http://www.fcc.gov//web/universal_service/welcome.html. (Accessed on 06/06/2006) provides this service in the United States of America through the Schools and Libraries Universal Service that was established as part of the Telecommunications Act of 1996 signed by President Bill Clinton of the United States of America. It expresses the purpose of providing affordable access to telecommunications services for all eligible schools and libraries, particularly those in the rural and economically disadvantaged areas. The section 254 of this Act will help schools and libraries to obtain access to state of the art services ands technologies at discounted rates

The FCC, through its decision making process, shapes the policy that will bring about this increase in the access to technology. This new law also requires the FCC and the state base that elementary and secondary schools, libraries and health services should have access to advanced telecommunications services.

The Snowe-Rockefeller-Exxon-Kerry Amendment in U.S.A is a provision of the Telecommunications Act of 1996 which directly addresses access of schools and libraries to telecommunications services. This provision specifies that, upon request, individual carriers must provide service to schools and libraries at affordable rates. The amount of the associated discount is to be reimbursed by the newly established universal system required by the 1996 Act.

The California Department of Education; www.cde.ca.gov/index.asp (accessed 07/06/2006) has its e-Rate based on the number of students eligible for higher discounts. Although their e-Rate applications process can

be difficult, they encourage every school district to consider applying for the e-Rate discount. Their e-Rate requires approved technology planning as a prerequisite for receiving Internet or internal connections discounts. The SDL provides the Technology Planning guide that gives five approved criteria for technology plans and the process for submittal and review of the e-rate technology plan.

In the African context, Lesoba Consult (2001), states that the e-Rate seeks specific discounts on connectivity to schools, libraries and other learning institutions in both urban and rural areas. More preferential treatment is given to schools in the rural areas. The Lesoba Consult (2001) further states that not all schools are created equal, therefore not all rates are equal. Very effective e-Rate allocation programs such as the one in the United States would grant discounts according to the levels of necessity if parameters for measuring necessity were provided. The Lesoba Consult (2001) continues to say that there are direct and indirect ways in which schools and libraries are funded. One is the direct transfer of government subsidies to schools, such as the Universal Service Fund (USF). Another is simply transferring access charges to a school fund or by direct regulation whereby operators are required in their licences to offer special rates to schools or learning institutions.

Lesoba Consult (2001) also refers to School Net Africa which aims to provide increased affordability for African schools through a project called Affordable Bandwidth for African Schools. School Net Africa proposes to do this by supporting the short-term and medium-term policies and regulatory tools that will seek to increase affordability of telecommunications services including access to the Internet.

In South Africa, Lesoba Consult (2001) states that in November 2001 the Parliament approved the amendment to the Telecommunications Act of 1996 which includes a provision for e-Rate. What is important in the provision in the Act is that the issue of affordability has been clearly identi-

fied as fundamental to access, especially given that in 1997 less than 1% of South African schools had access to the Internet. The Independent Communications Authority of South Africa (IDASA), the regulatory authority, will need to determine how this e-rate will apply in public schools. However, it assumes that schools should automatically receive discounts from the service providers under the supervision of IDASA.

Dr Ivy Matsepe-Cassaburi, the Minister of Communications in South Africa, delivered a speech at the Africa Regional Preparatory Meeting of the World Telecommunications Conference (WTCD) in Qatar in 2006, www.itu.int/ITDU/wtdc06 (accessed 01/08/2006) in which she referred to the Plan of Action that was declared in the Turkey WTCD in 2002. This plan outlined programs to be implemented for the provision of affordable access to telecommunications and the Internet. She announced that South Africa as a country has been working very hard at implementing different programs to give life to the Action Plan adopted in Istanbul in 2002. Among these programs she mentioned a legislation change which incorporates an e-Rate specifically formulated for educational institutions (primary, secondary and tertiary) in South Africa. The new legislation will provide fifty percent subsidy to such institutions. She further explained that this subsidy relates to a portion of the cost of dial-up being borne by the relevant telecommunications operator and the balance by the relevant education institution.

Matsepe-Cassaburi further stated that another strategy that has been adopted is the formulation and inclusion of the universal service obligations in the telecommunications service licences of all telecommunications operators applying for access to broadband/Internet spectrum. This obligation emphasizes Internet connectivity to public schools and other educational institutions, for people with disabilities and those located in the rural areas. Thereafter, rollout is expected to be undertaken in urban schools. According to Matsepe-Cassaburi, it is anticipated that by 2013 all public schools in South Africa will have access to Internet.

According to the South African government's White Paper on e-Education (2004) the Education Ministry is realistic about the fiscal constraints affecting the government regarding funding and resourcing ICT Implementation. However its policy highlights certain inherent cost implications such as cost of usage, rental maintenance and the cost of protection. The White Paper also refers to the Telecommunications Act of 1996 and the amendment of 2001 which calls for the implementation of the e-Rate for the General Education and Training (GET) and Further Education and Training (FET) institutions to address the recurrent costs of connectivity that are made on ongoing requirements reviews. The White Paper further refers to the Universal Service Access (USA) which is enshrined in the 2001 amendment of the Telecommunications Act of 1996 and the Ministerial Policy Direction. Both seek to promote USA to enable reliable connection to communications network that enables any form of communication to and from any part in South Africa.

2.2.2.7 e-Readiness and Multipurpose Community Centres (MPCC) / Telecentres

The National Information Technology Forum (NITF) describes the Multipurpose Community Centre as an organization offering a range of developmental services (including information services) to a specific community, with a large degree of community involvement (MPP Research Report 1998) www.sn.apc.org/nitf/mpcc (Accessed 15/06/2006)

The Government Communications Information Services (GCIS) defines the MPCC as a place where a number of services are provided by local, provincial and national government as well as parastatals (GCIS Report, 2001) www.gcis.gov.29/mpcc// (Accessed 04/07/2006)

Proenza *et al.* (2001) define a telecentre as a shared site that provides access to Information and Communication Technologies (ICTs) www.iadb.org/regions/itdev/telecenters (Accessed 05/07/2006)

McConnell Institute (2001) states that the availability of community access centers, both free and paid indicate that there is cooperation between the government and the private sector to provide its citizens access to services provided by the government departments, *(e-Governance)*. According to McConnell Institute (2001), this is one of the criteria used to assess e-Readiness. In Malaysia for instance, three business consortiums collaborated with the government to create an e-Government portal that enables the citizens to pay utility bills, traffic fines and renew licences using the Internet kiosk. In Mexico, the government developed e-Health connecting all hospitals to the Internet to facilitate exchange among health workers and access to new information for indigenous people.

In the South African context, Jacobs and Herselman (2005) point out that telecentres are seen as a measure of offering a wide range of ICT services required by communities and for helping to empower communities to bring about its own development. Telecentres may be initiated by independent individual agencies like the Universal Service Agency (USA) or as part of the Government initiative such as the Telecentres Programs of the Government Communication and Information Service (GCIS). According to Jacobs and Herselman (2005), telecentres are also known as "community services," "community information centres," "community resource centres" or community computer centres. They prefer referring to them as the Multipurpose Community Centres.

The Government Communication and Information Service (GCIS) identifies the MPCCs as a primary vehicle for the implementation of development communications and information programmes since they are capable of offering a wide range of services that the communications can use towards their own empowerment. However, Jacobs and Herselman (2005) illustrate that that individual success of any MPCC or Telecentre is the degree to which it becomes an integral part of the community it serves. They also indicate that in the South African context, the MPCCs are defined as those centres that have at least six government departments offering ser-

vices. Government services add value to other services that are offered by the non-governmental organizations (NGOs) and business centres. An MPCC should also have access to technology in the form of Information Technology Centre (ITC) such as a telecentre or other form of technology.

The GCIS Report (2001) identifies the following as the best practice characteristics of an MPCC:

- **Sustainability** -: This involves all facets of political issues of the project. It means its ability to maintain and prolong services with resources available, depending on services provided, income generation and future plans.

- **Ownership** -: This refers to management structures. This depends on the services provided and resources available. Small and effective managerial staff is important to an MPCC.

- **Linkages** -: This refers to the relationship that the MPCC shares with other related or unrelated organizations. The extent of the centre's connection with other centres largely determines its success or failure.

- **Services** -: Services provided vary from centre to centre. One of the best practices in terms of service is demand-driven service i.e. services provided are those defined as being needed by the community.

- **Finances** -: Financial services are very important to the success and failure of an MPCC. It is important to have a clear strategy on fundraising income for the centre. Also, a clear business plan is generally accepted as a good practice for an MPCC.

The GCIS Report (2001) further identifies the following key aspects as important to every MPCC:

- **Political neutrality** -: The centre must be a non-political community institution closer to all people.

- **Physical infrastructure** -: The community needs to use existing accessible infrastructure as a site for providing service. In areas where there are no appropriate buildings to be used as MPCCs, other options of providing prefabs or containers need to be explored.

- **Integrated Service Delivery** -: An MPCC is a place where people have access to information and services from various service providers. This may include Government (Labour, Home Affairs, Welfare, Education and Culture) parastatals such as Eskom, Telkom, Development Bank of South Africa, etc.

- **Information** -: Information from all sectors is critical in the MPCC. Government information, policies and plans should be communicated through these institutions.

Buthelezi *et al.* (2005) refer to these centres as telecentres. They however, explain that the centres may range in size, description and services. Telecentres may operate within the MPCCs, which provide a wider range of community services. They further state that regardless of different configurations, all centres have one common feature: the use of IT to provide a range of services using a shared access model. Buthelezi *et al.* quote Etter (2005) who traces the telecentre movement in Africa. Etter (2005), points to the fact that the advent of Telecentres in Africa is still very young, the earliest having started in 1998. Furthermore, the nature and functions of African telecentres vary from country to country. His concern though is that in developing countries, the focus is more on infrastructure development while the developing of human resource capacity, production and dissemination of information content still needs some attention. This is a cause for concern, he argues, because for telecentres to maintain an inte-

grated approach to ICT for development, intervention is essential to ensure that overall goals of the society are achieved.

The MPCCs in South Africa have been renamed and are now referred to as Thusong Service Centres. The Government Information and Communication Services (GCIS) announced its 2006-2014 business plan for the rollout of Thusong Service Centres. It was accepted by the South African parliament in January, 2005. The business plan outlines the way forward for continued sustainability and improvement of existing centres as well as extension of these centres to each of South Africa's 283 municipalities by 2014. According to the GCIS report on the Thusong Service Centres Program (2006), the total number of existing Thusong Service Centres is 87, with more than 700 services in areas that were not previously serviced, especially the rural areas. They offer e-government services such as applications for identity documents, welfare grants, unemployment insurance etc. They also provide training in the use of computer and the Internet. Other services include community banking, women's clubs, food production programs and community events such as meetings, voting, workshops and music concerts. The centres are based on the Batho-Pele values which are the South African government's principles for good public service.

The report further indicates that the rollout for the Thusong Service Centres in South Africa is gaining momentum. However it points that the existing centres cannot meet the information and communication needs of South African communities. It therefore suggests that communities should approach their local governments or municipalities to consider building a Thusong Centre in their areas which can then be managed by the community itself.

Oyedemi (2005) emphasizes the role of schools as access points to provide services of a telecentre. He says that schools should provide ad-

vanced access to IT and telecommunications services with some degree of support and training and a range of information-based services. They should enable the community to access government services, to obtain state benefits and to deposit savings through a government portal within the school. Such schools are known as e-Schools and they are further discussed below.

2.2.2.8 e-Readiness and e-Schools

According to the South African government White Paper on e-Education (2004), the creation of e-Schools is the policy goal for e-Education. It describes the e-Schools as learning institutions that have learners who use ICT to enhance learning, qualified and competent teachers who use ICT to enhance teaching and learning and competent leaders that use ICT for planning and administration. Further, these institutions have access to ICT resources that support curriculum delivery and connection to technology infrastructure. The White Paper (2004) goes on to state that the aim of the Department of Education is for the e-Schools to connect with the community by allowing community access to its computer facilities after hours and serving as a venue for business advisory services and training for community-based businesses. The schools would also assist the community to access government services through a government portal, *(e-Government.)* The Department believes that through this connection, the e-Schools will receive support from the community and local SMMEs to maintain and sustain ICT interventions. The guidelines for this collaboration will be provided by the Department of Education.

Van Wyk (2007), who is also the national Director of Information Communication Technology in the Department of Education, elaborates on this policy goal. She points out that the South African Department of Education's 2013 rollout strategy for e-Education feeds into and forms the local arm of the NEPAD e-Schools Initiative. The NEPAD e-Schools Initiative comprises of different projects. One is a ten-year NEPAD flagship

e-Schools Initiative that involves the establishment of an Africa-wide satellite network. This project aims to connect e-Schools to the Internet as well as to points within each country from which educational content will be fed to the schools on a continuous basis. According to Van Wyk (2007), the e-Schools demonstration project has already kicked off in many African states. The South African project took place at Maripe School in Mpumalanga.

The Lesoba Consult (2001) states that School Net SA is a collaboration between the government departments and the private sectors to extend technology to schools and to create of provincial technology hubs. According to Lesoba Consult (2001), the Department of Communications in South Africa has approved the legislation that provides an e-Rate specifically formulated for educational institutions in South Africa from the primary school level up to the tertiary level. It will provide fifty percent of the subsidy rates to the cost of accessing telecommunications and connection to the Internet. This is in line with the Government policy goal to transform teaching and learning through Information and Communication Technology.

2.2.2.9 e-Readiness and m-Learning

According to Motiwalla (2007) m-Learning is the integration of mobile technology in the traditional classroom and in distance learning. This involves the extension of e-Learning into wireless or hand held (W/H) devices. He further points out that m-Learning intersects mobile computing in the sense that it allows individual learning anytime and any where. It allows students and instructors to utilize their spare time while travelling by bus or train to finish homework and lesson preparation. Students can also access class material anytime, anywhere.

The potential and convenience of mobile learning anytime and anywhere is reiterated by Chen *et al* (2008 sic). They state that mobile devices such as cell phones and personal digital assistants (PDAs) can facilitate hu-

man interaction and access to information resources at anytime and in any place. They can be adopted to access information and Internet resources without the time and place constraints.

Motiwalla (2007) elaborates that research in the introduction of ICT in education has shown that it is effective only if developers understand the strengths and weaknesses of technology and integrate technology into appropriate pedagogical practices. To address these concerns he proposes an application framework for m-Learning. This framework consists of two levels of research and analysis. The first is e-Learning and the second is mobile connectivity. e-Learning refers to the use of ICT in education which according to Motiwalla (2007), has made learning more individualized, learner-centred and has set the stage for a successful m-Learning environment.

Mobile connectivity enhances the "anytime and anywhere" potential of e-Learning during times when a learner is not at home or at work in front of a computer and cannot access course details or complete their coursework. Motiwalla (2007) further identifies more benefits for mobile learning. These are mobile applications that improve collaboration via real-time or instant interactivity, regardless of time and location, leading to better decision-making. These benefits can prove equally useful for improving the learning environment.

Chen *at al.* (2008 sic[1]) however show that although previous studies indicate significant support for m-Learning, few researchers have discussed ways of integrating mobile devices with web-based learning processes by generating a ubiquitous learning environment. They argue that building a ubiquitous learning environment needs ubiquitous learning devices accessi-

[1] This thesis is submitted in the 2007 academic year. Some of the references recently downloaded from *Science Direct* are however dated for 2008. The abbreviation *sic* is used to indicate that the date is written as indicated on the reference.

ble to every learner. Consequently, a cell phone is the only suitable candidate among other various mobile devices such as PDAs, table PC or laptop.

Chen *et al.* (2008) further refer to three representative models necessary for the construction of a ubiquitous learning environment, namely, Learning Awareness, Schedule Reminder and Mentor Arrangement. Learning awareness considers the cell phone as an instant message transceiver affecting the learners' behaviour. It recommends the concepts learners should learn through Short Message Service (SMS) messages. It indicates proper instructions and notifications that can be transmitted to students through SMS. Schedule Reminder enables learners to be aware of teacher's instructions and their own learning modules. Students are reminded of incoming tasks and urged to complete them. Mentor Arrangement Module acts as a mediator in peer consultation and discussion through SMS. It recommends three consulting classmates, (called mentors) and arranges appointments with learners with learning difficulties.

Rau *et al.* (2008 sic) [2]also highlight the importance of SMS messaging in mobile learning. According to these researchers, students consider instant messaging as one of the most useful applications. They state that SMS messaging is expected to bridge the gap between formal and informal learning approaches. Furthermore, mobile learning increases interpersonal communication among people, mostly in an informal style, which is more effective in social learning. According to Rau *et al.* (2008 sic), SMS is more desired than face-to-face communication since it reduces pressure upon people to respond immediately. It also encourages more help seeking behaviour in that students feel less threatened or embarrassed to seek help.

Motwalla (2007) however contends that although it seems inevitable that m-Learning will soon be an essential extension of e-Learning, the tran-

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[2] Although Rau *et al.* is dated 2008, it already appeared as a post dated in 2007 and was used in this thesis in 2007.

sition will not occur overnight. The promise of instant access to learning anytime and anywhere is an enormous benefit but will have to be restricted until the technology of wireless data access matures.

In the South African context, Van Wyk (2007), the national director of ICT in the South African Department of Education, points out that amid a clamour for improved education, the Department of Education has unveiled one of the most ambitious and certainly one of the most crucial technology projects in recent years. This forms part of its ICT for e-Education strategy for 2013. She says this time the Department of Education will focus on newer and more sophisticated technologies. Personal computers are a starting point. The Department of Education plans to provide richer learning experience with interactive white boards, PDAs, laptops, cell phones and iPods. Van Wyk (2007) believes this technology can change the way the students learn, open up a world of high quality learning tools and material, teaching twenty-first century skills and removing barriers of place and time.

Van Wyk, (2007) however, concedes that a project as ambitious as this one will need investment from the government and the private sector. Last year saw the beginning of a feasibility study by KPMG commissioned by the Department of Education. The study is done in close collaboration with the State IT Agency, National Treasury and the Department of Communications. Van Wyk (2007), states that this will result in the presentation of options for procurement and operational models to implement ICT in education. The exact levels and investments that are needed will only be known after the feasibility study is completed in 2008.

2.3 SYNTHESIS

The researcher selected e-Readiness as the theoretical framework that underpins this study. Buthelezi *et al.* (2005) describe e-Readiness as a concept relating to how skilled and willing the societies, regions, communities and institutions are to utilize ICT to access and utilize global electronic re-

sources of business, education, health, and government and leisure activities. McConnell Institute (2001) and the Economist Intelligence Unit (2005) indicate attributes or key elements that are used to assess the level of e Readiness of different countries. This researcher has conducted a literature survey to establish what different authors have stated regarding e-Readiness and e-Education. Thereafter a link was created between e-Readiness and other concepts in relation to teachers in the rural schools.

The theoretical framework presented in this study is premised on the factors outlined below that this researcher regards as key elements to determine whether teachers in the rural schools are ready to accept technology and willing to utilize it to improve the level of education and to uplift the rural communities. The framework also intends to present solutions to the problems that prompted this study. These factors are discussed below:

2.3.1 Teachers' Attitudes and Perceptions

This is viewed in the light that teachers are responsible for the use of technology in the classroom. With this responsibility lies the success or failure of e-Education delivery in the rural schools. The concept of Technology Acceptance addresses the teachers' attitudes (acceptance or resistance) and further establishes factors that contribute to these attitudes. It is necessary to tap these factors in order to develop teachers who are receptive of technology and are willing to integrate technology into their teaching activities in order to improve the standard of education and to help improve the lives of rural communities.

2.3.2 Technology Availability and Accessibility

The attitudes of teachers in rural schools towards the use of technology may be linked to the extent of their exposure to it. Bridges.Org (2005) addresses the issue of accessibility and points out that the technological "have-nots" are mostly found in the rural communities, therefore teachers in these areas may be challenged by the fact that they have limited or no technological skills. Therefore the issue of connectivity demands attention.

Rural schools need to be connected and provided with affordable access to telecommunications and technology services. The Lesoba Consult (2001) refers to the e-Rate provided by the government through the Universal Service Fund (USF), which aims to provide increased affordability of telecommunication services to schools and libraries.

According to Naidoo and Klopper (2005), South Africa has shown a commitment towards the integration of ICT as an essential part of their economy, and for social and academic advancement. It has begun to introduce legislation that helps the growth of, access to and affordability of ICT. Naidoo and Klopper (2005) refer to the South African government strategy that addresses the problem of connectivity and availability of technological and telecommunication services in rural areas. They state that the government, in its efforts to strike a balance between economic growth and social improvement, introduced the South Africa IT Industry Strategy Project (SAITIS). The specific initiatives sponsored by SAITIS include providing Internet access to schools, community Internet access points and installing public information to government services.

The Universal Service Fund is another government initiative to provide schools with affordable access to technology and telecommunication services. It gives more preferential treatment to schools in the rural areas. Therefore, accessibility is also a determining factor as to how educators perceive technology and its value to education.

2.3.3 Improved Quality of Education

According to the South African government's White Paper on e-Education (2004) the policy goal of the Department of Education in South Africa is to improve education through the ICTs. The focus is to provide education that is relevant to the new generation of young people growing up in the digital world. E-Learning is a concept involving the use of telecommunications, Internet and any other forms of media to provide information and knowledge. Therefore schools in the rural areas need to be

networked and connected to telecommunications and technological services to enable teachers to deliver the government's mandate to provide quality education to all learners. Such schools are known as e-Schools. An e-School is an institution where teachers use technology to enhance learning and learners are challenged to operate on higher order skills. e-Schools will be further discussed later in this section.

2.3.4 Teacher Training/Retraining

After addressing the issue of availability and accessibility, the attention needs to be focused on the qualifications and technological skills for teachers in the rural schools. Inadequate qualifications and the lack of necessary technological skills can affect the teachers' ability to perform in class using technology. This is one of the barriers to their acceptance of technology and this consequently cancels the learning benefits expected to arise from this learning experience. Thus, teachers in the rural schools need to be provided with opportunities to be trained or retrained in order to perform their duties in class with confidence and to deal with what Demetriadis *et al.* (2003) refer to as *techno phobia*, meaning the fear of technology.

2.3.5 Schools and Community Upliftment

According to Sikhakhane *et al.* (2005) there is lack of access to information in rural communities in the developing countries. In urban communities, people have easier access to resources such as libraries, computers and Multipurpose Community Centers that can be used to access information. There are additional factors contributing to this lack of facilities in the rural areas. These include low literacy level, high rate of unemployment and lower levels of income. Naidoo and Klopper (2005) hold the view that South Africa has been able to extend its base on ICT usage with the development of infrastructure and a small but highly skilled professional base. However, not every citizen is enabled to use ICT because access and technology are only available in primary and secondary towns and not in the remote and rural areas. This problem has been addressed in some rural ar-

eas where the MPCCs or telecentres have been established and where they offer a wide range of developmental services including information through a government portal.

The schools are public institutions and if they are networked and connected to telecommunications, they can be used to provide similar public services to rural communities within which they are situated. Schools can establish relations with their communities and provide a wide range of services like access to government services (e-Health, e-Economics, etc). They can also provide skills-training in community based programs such as Adult Computer Literacy classes. Such schools are known as *e-Schools*. According to the White Paper on e-Education (2004) the Department of Education in South Africa is to establish guidelines regarding this school and community collaboration.

2.3.6 Technology and Gender Equity

Guermazi (2003) explains that women in the rural areas have few opportunities to become a strong and viable part of modern developments. Most of them are unemployed and are historically housewives or subsistence farmers. Women in the rural areas need to access information and programs that will improve their livelihood. The government needs to include policies that ensure equitable distribution of investments in ICT and create technological programs that address the interests of women in the rural areas. The South African government's policy of Universal Access provides for the extension of telecommunications and technology to all citizens including the marginalized groups, which include women in the rural areas. Therefore schools in the rural areas should encourage females to take up computer studies, which are now referred to as Computer Applications Technology (CAT) according to the new system of education in South Africa called the New Curriculum Statement (NCS). This will enable these young women to have access to educational programs and government services that enable them to obtain equal opportunities in employ-

ment and venture creation, increase their self-esteem and extend their capacity for starting their own businesses. Teachers should also emphasize that gender and ICT do not imply power relations between men and women but among women themselves. Women should use technology to improve their own livelihoods.

2.4 LITERATURE REGARDING RESEARCH METHODOLOGY

The researcher used the quantitative research that involved a survey conducted using a representative sample of educators from randomly selected rural schools. According to Lubbe and Klopper (2004), random sampling is a simple form of sampling and since all probability must provide a known nonzero chance of selection for each population element, simple random sample is considered a special case in which each population element has a known and equal chance of selection. Questionnaires were distributed to the selected schools after permission was obtained from Kwa-Zulu-Natal Department of Education.

The researcher used the statistical program SPSS 13 to analyse data and to determine correlations between variables. SPSS 13 was also used to compile tables and graphs. The Pearson Test of Significance was used to determine the significance of correlations

2.5 LITERATURE REGARDING THE EXTENT TO WHICH OTHER RESEARCHERS HAVE MANAGED TO SOLVE PROBLEMS IDENTIFIED IN SECTION 1.2 OF THIS STUDY

The researcher conducted a literature review of work from local authors to determine whether they have addressed the problems stated in section 1.2 of this study. A NEXUS search was conducted on 21/ 10/ 2006 and it revealed that no research has been conducted on e-Education and e-Readiness. A Science Direct search was also conducted on 24/10/2006 and it revealed seven entries on e-Education and three entries on e-Readiness.

However, the information obtained from these sources does not address the research problems and therefore does not justify the elimination of any of the problems from further research.

2.6 RESEARCH QUESTIONS

A survey of possible prior research about e-Education in rural public high schools in KwaZulu-Natal has not brought to light any research done among rural educators about e-Education to date. It is therefore confirmed that the interim research questions posed in section 1.4 of Chapter 1 can be confirmed as the actual questions that will be answered by means of the researcher's own empirical findings in the final chapter of this dissertation. The research questions are:

Question 1: What are the attitudes of educators in the rural schools towards using ICT for e-Education?

Question 2: Are educators ready to use ICT or do they feel threatened by it?

Question 3: How do educators in rural schools perceive ICT for e-Education in relation to other modes of education delivery?

Question 4: Do educators in rural schools possess adequate qualifications and skills to enable them to teach effectively in an e-Education setting?

Question 5: Are rural schools adequately equipped to implement e-Education?

Question 6: Could different perceptions expressed about e-Education by educators in rural public schools of KwaZulu-Natal be related to demographic differences such as differences in gender, age, etc within the sample?

Question 7: What training /retraining will educators in rural schools have to undergo to enable them to use ICT for e-Education?

2.7 CONCLUSION

In this chapter the researcher conducted a literature review of the existing material relating to the research problem. The researcher also reviewed literature regarding the extent to which other researchers have managed to solve the problems identified in the previous chapter in order to eliminate those from further research. The researcher then formulated a theoretical framework that underpins this study. This framework will interpret the empirical results and present solutions to problems that prompted this study. Furthermore, the researcher reviewed research questions stated in chapter 1 to establish whether they have been addressed by the literature study. In view of the absence of prior research on e-Education in the rural areas of KwaZulu-Natal, the researcher confirmed the research questions as the actual questions to be answered by the theoretical findings of this study.

Chapter 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In the previous chapter, the researcher conducted a literature review and then formulated a theoretical framework for interpreting the empirical results of the research. The review of research questions stated in chapter 1 was also conducted. These were confirmed as the actual questions to be addressed by this study. In this chapter the researcher will outline the research methodology used in this study to provide empirical answers to the research questions posed at the end of the previous chapter. It will also explain procedure followed in preparation, data collection and processing.

3.2 THE NATURE OF RESEARCH

This research is of trans-disciplinary nature, combining ICT, Education and Communication. It is a quantitative and analytical study that entails methodology involving selection of respondents (sampling), use of questionnaires as research tools and data processing using the analytical program SPSS 13.

3.3 PLANNING

In this section the researcher describes the process that was followed in making preparations for conducting the survey.

3.3.1 Permission in Principle Obtained from the KZN DoE to Conduct Research in Public Schools in the eThekwini Region

The survey was conducted within randomly selected high schools in the Umbumbulu District. Permission was first obtained from the Depart-

ment of Education in KwaZulu-Natal to access the schools. The research supervisor wrote the request letters on behalf of the researcher. Other request letters were addressed to the District Manager and to Principals of the selected high schools.

3.3.2 Selection of Respondents

The database of the Education Management Information Service (EMIS) unit of the KwaZulu-Natal Department of Education was used to obtain information on schools in Umbumbulu District. Thereafter a random selection of schools was conducted to draw a sample that is representative of all teachers in the rural schools of KwaZulu-Natal. According to Leedy and Ormond (2005), random selection means choosing a sample in such a way that each member of the population has an equal chance of being selected. When such a random sample is selected, the researcher can assume that the characteristics of the sample approximate the characteristics of the total population. A total number of 33 schools were selected.

3.3.3 Research Instrument

The researcher chose the questionnaire as the appropriate instrument for collecting data for this survey.

3.3.3.1 Development of the questionnaire

A structured questionnaire was used. According to Lubbe and Klopper (2004) a structured questionnaire is ideal in a large-scale data collection. Here, respondents choose from a collection of alternatives and assign a numerical score or a ranking. The questionnaire was developed over a period of three months by the group of researchers involved in the study. It was developed in English and was subjected to the scrutiny and correction by the supervisor of this study.

3.3.3.2 Guidelines followed in constructing the questionnaire

According to Leedy and Ormrod (2005) a questionnaire can be tricky to construct and administer and one false step can lead to uninterpretable

data or dismally low return. These authors advise that a questionnaire should encourage people to be cooperative and also yield responses that you can use to interpret results of your study. Leedy and Ormrod (2005) offer the following guidelines for developing such a questionnaire:

- **Keep it short:** The questionnaire should be as brief as possible and solicit only information that is essential for the research project.
- **Use clear and unambiguous language:** It should consist of questions that communicate exactly what you want to know
- **Keep it simple:** Long and complicated items should be avoided as they are difficult to understand and the respondent may be unwilling to read them. You should make the respondent's task as simple as possible.
- **Make your questionnaire attractive and professional:** It should have clear lines, crystal clear typing and perhaps two or more colons.
- **Conduct a pilot test:** Give your questionnaires to at least 4 or 5 friends to establish whether they have difficulty in understanding any items.
- **Finally, scrutinize the final product:** Check it carefully to ensure that it addresses your research needs

Although Leedy and Ormrod (2005) recommend that the questionnaire be short, a longer questionnaire had to be used for this particular study. This was necessitated by the nature of the study. This is a coordinated study whereby a group of researchers investigate different groups involved in education i.e. learners, teachers, principals and District Managers. Therefore, a longer questionnaire that accommodates all the targeted groups had to be used.

3.3.3.3 Questionnaire Design

This section gives a brief outline of the questionnaire. The questionnaire can be found in addendum 3. The respondents were assured of the anonymous and voluntary nature of the survey. However they were informed about the importance of their participation regarding the validity and authenticity of the study. The questionnaire contains a section that provides an explanation of technical terms and also describes electronic communication devices in order to enhance the respondents' understanding of the questions and enable them to answer all questions without difficulty. The questionnaire also contains a section that explains the procedure of answering the questionnaire.

3.3.3.3 Breakdown of Questions

The questionnaire is divided into 5 parts. Below is the breakdown of the questions:

Part 1: Questions 1-6 ask general personal particulars such as age, gender and home language. They address number 6 of the key research questions

Part 2: Questions 7-15 ask questions about the communication instruments that the respondents use at home. These address number 2 of the key questions.

Part 3: Questions 16-41 ask questions about computer software programs used at home. They also address number 2 of the research questions.

Part 4: Questions 42-56 ask the respondents about computer software programs that they use in school. These address numbers 2 and 5 of the research questions.

Part 5: Questions 57-60 ask the respondents about electronic learning facilities available at their schools. These address number 5 of the research questions. Questions 61 to 68 address numbers 1 and 2 and questions 69 to 79 address numbers 4 and 7 of the key research questions.

3.3.3.4 Formulation of Questions

The researcher used structured questions consisting of scaled items. The Likert-type scale offering five options was used. According to Arnold *et al.* (2000) www.jamescmccroskey.com/publications/25.htm-11k (Accessed on the (09/11/2006), the Likert-type scale is the most popular method used to measure attitudes. They state that further research confirms the fact that they are reliable and valid instrument for attitude measurement. The respondents were requested to read the questions and mark the appropriate response with a tick or a cross.

3.3.4 Administration of Questionnaire

The researcher first visited the schools after securing appointments via telephone with the principals through telephone. This was done to deliver letters requesting access to teachers of the selected schools. It also offered an opportunity to explain the nature of the survey and to request any assistance that may be required by the researcher. In some schools access to teachers was allowed on this first visit and in others arrangements were made to meet with the teachers at a later date. At these meetings the researcher had an opportunity to explain to teachers the nature and purpose of the study and the process of answering the questionnaire. The researcher was requested to leave the questionnaires and collect them after a period ranging from 5 to 6 days in order to allow teachers enough time to complete the questionnaires. In some of the schools, members of the School Management Teams offered to assist with the collection of questionnaires from the teachers, a gesture that was highly appreciated by the researcher.

3.4 DATA PROCESSING

During the survey the respondents were required to mark their responses using a cross or a tick next to the appropriate response. They were also asked to provide information where required. The total number of questionnaires returned was 440 out of 500 that were distributed to the

surveyed schools. The responses were then entered into the SPSS 13 statistical program.

3.4.1 Setting up encoding parameters on the SPSS

The SPSS program consists of two virtual sheets. These are the Variable View and the Data View. It is organized in vertical columns and horizontal rows. The columns represent a particular question in the questionnaire. The rows represent responses from each respondent. The coding parameters of data collected from the questionnaires are set up in the Variable View by clicking on a particular cell in the values column and stipulates the numeric equivalent of the response options in the questionnaire. The Variable View is displayed in figure 1 below.

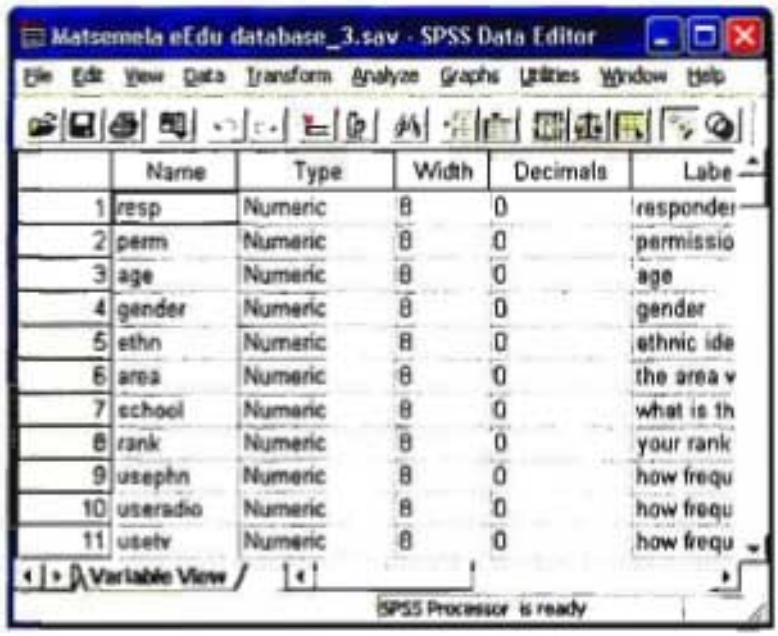


Figure 1: An screenshot example of the Variable View in SPSS where data coding parameters are set up

The responses were entered in the Data View table from left to right along the row of that particular respondent. The datum was entered in a cell where a row and column intercept. In this way data for each respon-

dent was entered one cell at a time. The Data View is shown in figure 2 below.

Figure 2: A screenshot example of how pull-down screens are used in SPSS to select pre-set coding options in the Data View

Spoilt response and *No response* coding options were also set up for each question in order to account for instances where respondents altered an initial response or simply neglected to answer the question. Double-checking each of the codes that were altered after the questionnaire had been encoded ensured the accuracy of the encoding process.

3.4.2 Type of measurements used

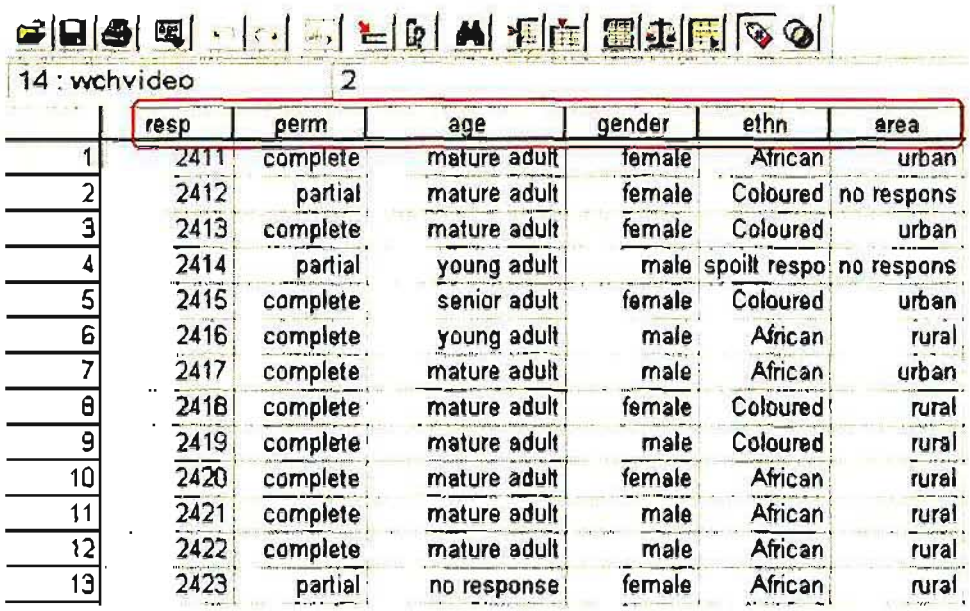
According to Leedy and Ormrod (2005) the quantitative research uses three types of measurements. These are nominal, ordinal and scalar.

- **Nominal Measurement**: This measurement is appropriate when the respondents select a particular subcategory within an overall category such as age, gender ethnic group etc.

- **Ordinal Measurement**: It is appropriate when the respondent makes value judgments (*x is taller than y or y is more expensive than x*) and where the individual responds in terms of standardized, generally accepted measure such as length, volumes, times, etc.

- **Scalar Measurement**: This measurement is appropriate when the respondent expresses non-standardized subjective and personal preferences, attitudes and opinions measured on a gradually changing continuous scale e.g. (*never, sometimes, often, constantly, usually, etc.*)

3.4.3 Entering data into SPSS program



14 : wchvideo 2

	resp	perm	age	gender	ethn	area
1	2411	complete	mature adult	female	African	urban
2	2412	partial	mature adult	female	Coloured	no respons
3	2413	complete	mature adult	female	Coloured	urban
4	2414	partial	young adult	male	spoilt respo	no respons
5	2415	complete	senior adult	female	Coloured	urban
6	2416	complete	young adult	male	African	rural
7	2417	complete	mature adult	male	African	urban
8	2418	complete	mature adult	female	Coloured	rural
9	2419	complete	mature adult	male	Coloured	rural
10	2420	complete	mature adult	female	African	rural
11	2421	complete	mature adult	male	African	rural
12	2422	complete	mature adult	male	African	rural
13	2423	partial	no response	female	African	rural

Figure 3: A snapshot example of SPSS data view, showing category headings (ringed red) and completed data entries

Once the parameters are set in the Variable view mode, headings and columns are then generated in the Data View. This is where the data is entered. In the Data Mode, codes are used as column headings. These headings appear as labels in the graphs and tables. It indicates the numeric and the shorthand codes that were used to represent particular responses. Each question used in the questionnaire is assigned a particular column in the database. The appropriate code variant for the individual response is entered in the column that deals with that question. The screenshot in figure 3 above shows the codes that are used as column headings.

3.4.4 Verifying the Accuracy of the Coding Process

The accuracy of the coding process was verified by double-clicking each code entered after the questionnaire had been coded on the database.

3.4.5 The Visual Representation of Data

In SPSS the results of statistical analysis are represented by means of tables and graphs that can be exported as graphical files to Microsoft Word, the software program used to write this dissertation.

3.4.5.1 Representing Results by means of Tables and Graphs

Tables were created by clicking the "Analyze" icon, activating general tables that were used to present data, for example as shown in figure 4 below, which shows the gender of respondents.

		Count	Col %
gender	female	224	56.0%
	male	160	40.0%
	spoilt response	1	.3%
	no response	15	3.8%
Total		400	100.0%

Figure 4: Typical table used to visually represent demographic results in SPSS

Graphs were created from the tables by selecting a graph option and using the information available from the tables. The researcher chose only those tables and graphs that would assist in the data analysis and these were saved in the special Word Folder.

Figure 5 below shows the example of one of the graphs used in this study. The graph shows the number of educators that use PC for playing educational games. The teachers had to respond to the question, "How frequently do you use a PC at home to play educational games?" The respondents were given options from which to choose their responses. These were: No PC, Daily, Sometimes and Never.

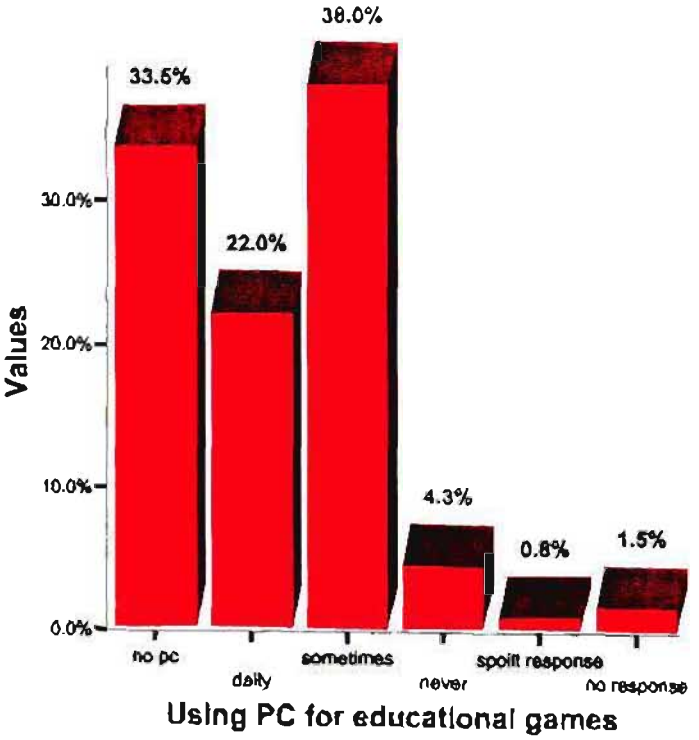


Figure 5: Typical bar graph used to visually represent results in SPSS

3.4.6 Determining the Statistical Significance of the Results

In this study the researcher envisaged using particular statistical tests and inferential tests to interpret data and to validate the results of the study. The researcher used statistical tables to interpret data and to visually describe the results of this study. According to Leedy and Ormrod (2005) descriptive statistics describe the body of the data. It describes points of central tendency, amount of variability and the extent to which different variables are related to one another. In this study the statistical tests such as Descriptive Frequency Statistics, Comparison Descriptive Statistics and

Central Tendency Statistics were used. The Inferential Statistics Tests such as T-Test, ANOVA, correlations and Chi-Square were also conducted.

Correlations

		p5.73.1	p5.73.2	p5.73.3	p5.73.4	p5.73.5
p5.69	Pearson Correlation	-.075	-.085	-.133*	-.140*	-.201**
	Sig. (2-tailed)	.143	.101	.012	.011	.000
	N	381	375	354	327	321
p5.70	Pearson Correlation	.013	-.006	-.047	-.022	-.076
	Sig. (2-tailed)	.796	.908	.375	.698	.171
	N	382	376	354	328	322
p5.71	Pearson Correlation	-.022	.013	-.055	-.030	-.077
	Sig. (2-tailed)	.674	.800	.307	.588	.173
	N	368	362	344	322	317
p5.75	Pearson Correlation	-.062	-.058	-.056	-.040	-.073
	Sig. (2-tailed)	.246	.283	.313	.494	.208
	N	346	340	323	301	298

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 6: A typical correlation table generated in SPSS showing levels of significance of correlations between factors according to the Pearson Significance Test where significant correlations are flagged by either one or two asterisks

Figure 6 above shows an example of a Pearson Significance Test conducted in this study. The numbers in the first column represent the variables that were compared to those in the columns across. Where the numbers meet, represents the degree of correlation between them. The letter p indicates probability. The interpretation rule for significance correlation is that if p value is less than or equal to 0.05 ($p<=0.05$), then there is statistically significance correlation. For instance, in the first row, the correlation results reveal that p5.69 in the first column and p5.73.1, p5.73.2, p5.73.3; p5.73.4 and p5.73.5 in the next four columns have a p value of 0.143, 0.101, 0.012, 0.011 and 0.000. This indicates that when p5.69 is compared with p5.73.1 and p5.73.2, they do not have statistically significant cor-

relation. However p5.69 with p5.73.3, p5.73.4 and5.73.5 do have statistically significance correlation.

In the final chapter the researcher will explain that, in spite of the application of the above quantitative tests, there are qualitative reasons why the results of the survey should be treated with circumspection.

3.5 CONCLUSION

In this chapter the researcher explained the procedure that was used in conducting the survey. The actual preparation of the research was outlined. This involved seeking permission to conduct research from relevant authorities, selection of respondents and the construction of the research tool and data collection. The researcher also explained how data was processed using SPSS 13 statistical program. In the next chapter the researcher will conduct data analysis and interpretation in order to draw conclusions and make informed recommendations.

Chapter 4

PRESENTATION AND INTERPRETATION OF DATA

4.1 INTRODUCTION

In the previous chapter the researcher explained various aspects of the research methodology that was used to conduct the empirical component of this study. The literature survey also included references regarding the appropriate theoretical framework on e-Readiness that will be used to constrain the interpretation of the empirical research results that are presented in this chapter by means of tables and graphs that were generated using SPSS version 13.

Before the results of the empirical survey are reported, the researcher presents the theoretical framework that will be used as framework to constrain the interpretation of the empirical results.

In the first part of the empirical section the researcher provides a generic demographic profile of the respondents. In the second chapter she reviewed literature with regard to technology adoption. In this section she provides the results of an empirical survey among teachers in rural schools with regard to the extent to which they have adopted basic and more advanced electronic communication technologies (ICTs). Towards the end of this chapter she presents significant correlations between demographic and perceptual factors, for instance correlations between a factor such as gender and some technology adoption factor as a possible explanation for different rates of technology adoption.

In this chapter the researcher envisaged running statistical tests in order to interpret data and to validate the result of this study. However, some

inconsistencies in responses relating to educators use of advanced electronic technologies were noticed (4.5). Due to this factor the researcher has decided this would be a futile exercise as these tests would not be able to serve the desired purpose.

4.2 THE THEORETICAL FRAMEWORK USED TO CONSTRAIN THE INTERPRETATION OF RESULTS

Before the results of the survey are reported, a brief summary of the salient features of the e-Readiness framework for this study is presented.. The theoretical framework of this study is premised on the factors outlined below that this researcher believes are key elements to be considered in determining the level of e-Readiness of educators in rural schools.

- **Educators' Attitudes to and Perceptions of Technology**: Educators are responsible for the implementation of e-Education in the classroom. It is therefore important that educators be receptive of technology in order to integrate it into their teaching activities.
- **Technology Availability and Accessibility:** Schools in the rural areas lack necessary infrastructure and need affordable access to technology and telecommunication services.
- **Improved Quality of Education**: The focus is on provision of quality education that is relevant to the new generation of young people growing up in a digital world to enable them to compete favourably with their peers in other countries.
- **Educator Training/Retraining:** Educators in rural schools need to be provided with opportunities to be trained or retrained in order to use technology in class with confidence and to effectively deal with techno phobia.
- **Schools and Community Upliftment:** Rural communities often lack electronic communication facilities. Schools are community institutions and if electronified and linked to the Internet they can of-

fer a wide range of developmental programs and e-government services through a government portal.

- **Technology and Gender Equity:** Women in the rural communities have few opportunities to be empowered and improve their livelihood. They need access to information and technological programs that address interests of women in rural areas.

4.3 RESULTS OF THE SURVEY

Having summarised the e-Readiness framework in the previous section the researcher now presents the results of this survey among educators in rural schools in the Umbumbulu District of the EThekwini Region of the KwaZulu-Natal Department of Education.

The researcher however wishes to state that she has noted inconsistencies in the results presented in this section regarding educators' adoption of advanced electronic communication technologies, (section 4.5). The results reveal some inconsistencies in terms of educators' responses regarding ownership of computers and the frequency at which they use these computers to access different programs. This factor might compromise the validity of the results of this study. Against this backdrop, the researcher therefore advises that results in this section should be treated with some degree of scepticism.

The researcher also envisaged running statistical tests in order to interpret data and to validate the results of this study. However, because of the inconsistencies mentioned above relating to educators' use of advanced electronic technologies, the researcher decided that running these tests would be a futile exercise as this would not be able to serve the desired purpose.

4.3.1 Demographic characterization of respondents

All the respondents that participated in this survey are educators active in 38 rural schools in the Umbumbulu District, which forms part of the

EThekwini Region of KwaZulu-Natal. This section presents a generic demographic characterization of the respondents who participated in this study. This relates to factors such as their gender, age group, ethnic identity, etc.

4.3.1.1 Age of Respondents

The age group ranges are 12-18 for adolescents, 20-34 for young adults, 35-45 for matured adults and 45 or more for senior adults. The respondent's age is presented in figure 7 below in the form of a table.

		Count	Col %
age	adolescent	1	.3%
	young adult	116	29.0%
	mature adult	144	36.0%
	senior adult	6	1.5%
	spoilt response	5	1.3%
	no response	128	32.0%
Total		400	100.0%

Figure 7: A table showing age ranges of respondents

According to figure 7, 36% of the respondents are mature adults. This distribution indicates that the majority of educators in the rural schools of KwaZulu-Natal are mature adults, followed by a sizable 29% who are young adults. Senior adults polled only 1.5%.

It is noted that a sizeable number of respondents (32%) did not respond to this question. This may warrant further investigation because age is a very important factor to consider in an attempt to determine attitudes as they can influence educators' willingness to accept changes that e-Education is going to initiate. Educators are at the forefront of the implementation of the e-Education policy because they carry the major responsibility of what happens inside and outside the classroom.

4.3.1.2 Gender Distribution of Respondents

Figure 8 below shows that 56.0% of the respondents are females and 40% are males. Almost 4% are no responses and 6% is a spoilt response.

		Count	Col %
	female	224	56.0%
	male	160	40.0%
	spoilt response	1	.3%
	no response	15	3.8%
Total		400	100.0%

Figure 8: A table showing gender distribution of respondents

There is a margin of almost 6% between the number of female educators who are a majority and the number of male educators. Therefore, gender could be used as one of the variables to establish whether there is a difference between males and females in terms of attitudes towards the use of technology in schools.

4.3.1.3 Residential Area of Respondents

The results reveal that the majority of respondents live in the urban areas. Figure 9 below shows that out of 400 respondents, 53% of respondents live in the urban areas and 19% live in the rural areas. No Responses polled 27.0%.

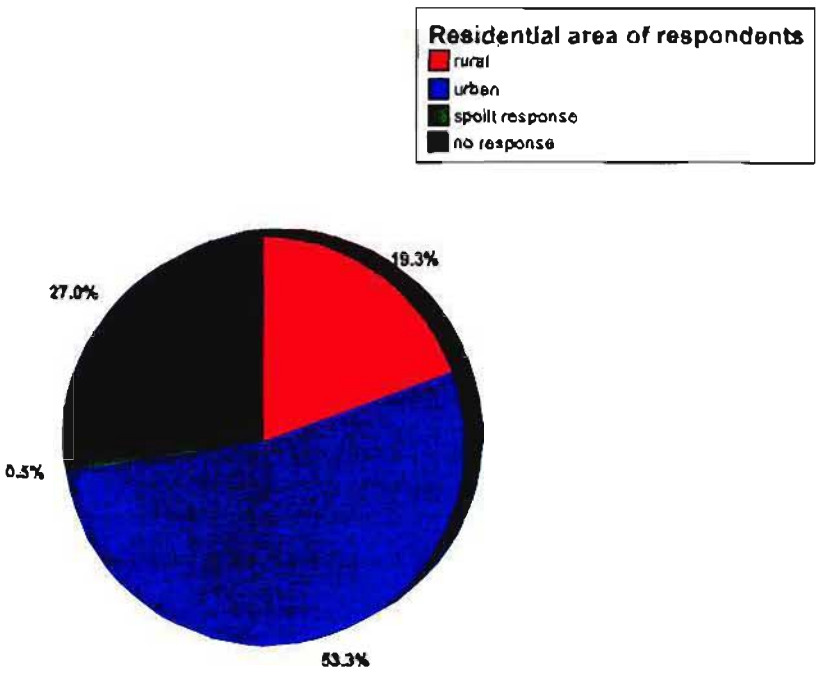


Figure 9: A pie graph showing the area where respondents live

It is interesting to note that the majority of respondents, fewer than 53%, live in the urban areas but work in schools in the rural areas. The schools in the rural areas are mostly poorly equipped and lack the resources that are necessary for the delivery of quality education. The working conditions at these schools therefore are not conducive for delivering effective teaching and learning and would hardly attract educators. The large number of educators who work in rural schools could be attributed to the shortage of vacancies prevalent in urban schools. This then forces educators to seek employment in the rural areas where there is always a short supply of qualified educators.

4.3.1.4 Gender Composition of the School

With reference to figure 10 below, the majority of educators, almost 77%, teach in mixed schools. Only a small percentage teaches in same sex schools, with only 0.5% in the girls-only schools and 12.0% in boys-only schools. This may be attributed to the fact that secondary schools in rural areas are very few and are sparsely distributed among the communities. These schools must therefore be able to accommodate all the children of that particular community.

		Count	Col %
what is the gender composition of your school?	girls only	2	.5%
	boys only	48	12.0%
	girls and boys	306	76.5%
	spoilt response	4	1.0%
	no response	40	10.0%
Total		400	100.0%

Figure 10: A table showing the gender composition of learners in rural schools

4.3.1.5 Rank of Respondents

Figure 11 below shows that 0.8% of respondents are Principals, 0.3% of educators are Deputy Principals, 9% are Heads of Departments (HODs) and almost 82% are Level 1 Educators. This would suggest that the majority of educators in rural schools are not in managerial positions. However, this researcher noticed during the survey that school principals shied away from answering questionnaires citing reasons ranging from time constraints to workloads.

		Count	Col %
your rank as an educator/ learner	level 1 educator	326	81.5%
	head of department	37	9.3%
	deputy principal	1	.3%
	principal	3	.8%
	no response	33	8.3%
Total		400	100.0%

Figure 11: Table showing the rank of educators in rural schools of KZN

Figure 8 illustrating gender distribution of educators in schools also indicates that there are more females (56%) than males (40%). These results would suggest that although females are a majority in rural schools, they are not represented in managerial positions and this may require further investigation into gender equity in rural schools of KwaZulu-Natal.

4.3.2 Summary of demographic characterization of respondents

The pattern emerging from responses in this section shows a sizeable number of No Responses in almost all questions. For instance, little less than 8% educators in figure 7 did not respond to the question about their age. Although this is a small figure, it is important to establish age of respondents since this study seeks to investigate peoples' attitudes towards imminent reforms in education and age could possibly influence peoples' attitudes towards and willingness to accept change. The reason for this number of No Responses could be based on the following: at the beginning of the questionnaire respondents were still uneasy about in answering questions as the number of No Responses declines as respondents continued answering the questionnaire.

The issue of gender equity in relation to managerial positions was also noted in this section. The results in figure 8 show that the majority of respondents were females. However, figure 11 shows that there are fewer women in managerial positions. The South African government's policy of Universal Access emphasizes the extension of technology and telecommunication access to marginalized groups, which includes women. This is

based on the belief that technology can be used to elevate the status of women and enable women to obtain equal opportunities in employment and in venture creation.

4.4 EDUCATORS' ADOPTION OF BASIC ELECTRONIC COMMUNICATION TECHNOLOGIES AS INDICATION OF E-READINESS

In this section the educators' responses regarding their use of basic electronic communication technologies are reported without comment. In a later section problematic aspects of their responses are addressed. According to Tinio (2002), ICTs include telephone, radio and television which are basic communication technologies as well as newer digital technologies such as computers and the Internet. He further points out that older technologies such as telephone, radio and television, although now given lesser attention, have for over forty years been effectively used for open and distance learning.

This section discusses whether teachers who work in rural schools have adopted the basic communication technologies and the frequency at which these are used, either for fun or educational purposes. This will enable the researcher to establish the level of their exposure to technology, their abilities and degree of readiness to use technological communication in their teaching.

4.4.1 Use of telephone

Figure 12 below shows that the majority of 62% of targeted educators indicated that they use the telephone daily and 33% said they sometimes use telephone. Only 3.0% respondents indicated that they do not have a telephone at home.

		Count	Col %
how frequently do you use a telephone?	no telephone	12	3.0%
	daily	248	62.0%
	sometimes	133	33.3%
	never	1	.3%
	spoilt response	4	1.0%
	no response	2	.5%
Total		400	100.0%

Figure 12: A table showing frequency at which educators use the telephone

It is noted that the majority of educators have a telephone and they use it on daily bases. This is an indication that educators still regard the telephone as an important tool for communicating with other people despite the advent of newer technologies like computers and e-mails. Spoilt responses and No Responses are not considered in this question because of negligible figures.

4.4.2 Listening to the Radio

The results in figure 13 below suggest that educators still regard the radio as a valuable communication and broadcasting technology with the majority of 68.3% indicating that they listen to the radio daily and almost 29% listen sometimes.

		Count	Col %
how frequently do you use the radio?	no radio	9	2.3%
	daily	273	68.3%
	sometimes	114	28.5%
	never	1	.3%
	spoilt response	1	.3%
	no response	2	.5%
Total		400	100.0%

Figure 13: A table showing frequency at which educators use the radio

The results also show that there are very few educators who do not own radios, only 2.3%, which indicates that the radio can be found in every household. It is a cheaper form of media and can be afforded by everyone. This result could also be an indication that teachers could be encouraged to use the radio as a teaching and learning tool especially because the South African Broadcasting Corporation offers special broadcasts of educational programs for all grades.

4.43 Use of television

		Count	Col %
how frequently do you use the TV?	no TV	4	1.0%
	daily	284	71.0%
	sometimes	108	27.0%
	never	1	.3%
	spoilt response	1	.3%
	no response	2	.5%
Total		400	100.0%

Figure 14: A table showing frequency at which educators use TV

The results in figure 14 on the right reveal that the majority of educators own television sets and they watch television on a daily basis. This would suggest that they recognize the value of television as an important source of information that provides a wealth of knowledge to impart to learners. Television is also less expensive and some schools in the rural areas can afford a few.

		Count	Col %
how frequently do you watch videos?	no vcr/dvd	29	7.3%
	daily	190	47.5%
	sometimes	167	41.8%
	never	3	.8%
	spoilt response	2	.5%
	no response	9	2.3%
Total		400	100.0%

Figure 15: A table indicating frequency at which educators watch videos

4.4.4 Use of Videos

Figure 15 shows that almost 48% of educators watch videos on daily basis, almost 42% watch them sometimes, 0.8% never watches them and 7.3% do not have VCRs. The total number of educators who watch videos, even though it is at different frequency levels (daily and sometimes) is 89%, which suggests that a significant majority of educators watch videos. This indicates some degree of e-Readiness and it also means that educators could be persuaded to make use of television as a valuable tool to enhance teaching and learning in the classroom and it offers special learning programs for all grades.

4.4.5 Summary of educators' adoption of basic electronic communication technologies

The responses to most questions in this section indicate that educators in rural schools frequently use basic communication technologies like telephone, radio, TV and VCRs. This could be attributed to the fact that these technologies have been around for some time and have become less expensive. In fact, there is a TV and a radio in every household, even in rural communities. However, a pattern that is emerging from responses shows that the respondents enjoy watching television more than other basic electronic devices. This could be due to the visual effects that the TV offers compared to radio. Television and radio remain valuable electronic technologies that can be used effectively in teaching and learning and educators

can take advantage of special learning programs that the South African Broadcasting Corporation is offering for all grades.

The results also reveal that there is a margin of only 1% between the number of educators who watch videos daily and those who use the telephone daily. However the television still remains the most popular communication technology among those discussed in this section.

The basic electronic technologies, although they are older, are still widely used for communication purposes and can still be used effectively in the classroom as a teaching and learning tool. Their advantage is the fact that they are less expensive and poor schools in the rural areas can afford a few.

4.5 EDUCATORS' ADOPTION OF MORE ADVANCED ELECTRONIC COMMUNICATION TECHNOLOGIES AS INDICATION OF E-READINESS

In this section the researcher seeks to establish whether educators have access to more advanced electronic communication technologies. Computers and the Internet form part of the advanced communication technologies. According to Tinio (2002), the use of newer technologies such as computers and the Internet is still in its infancy in developing countries, if these are used at all, due to limited infrastructure and the attendant high cost of access. This section therefore aims to establish whether educators who teach in rural schools have computers and the frequency at which they use computer software programs, as a determinant of e-Readiness.

4.5.1 Educators' use of computers at home

Figure 16 below indicates that majority of respondents; almost 37%, own one computer, although there is a margin of only 2% between these and those educators who do not own computers. A further 5.0% has more than 2 computers and 0.3% has more than 4.

		Count	Col %
how many computers are there at your home (including laptops)?	none	139	34.8%
	1	147	36.8%
	2	20	5.0%
	4	1	.3%
	more than 4	1	.3%
	no response	92	23.0%
Total		400	100.0%

Figure 16: A table showing the number of computers educators have in their homes

These results would suggest that educators who work in rural schools do have computers at home. However, this researcher noticed inconsistency between these results and responses to questions in subsequent subsections regarding educators' computer usage (as stated in 4.3) Responses to almost all questions suggest that educators do not have computers and therefore are not using most computer programs. The researcher views this factor with great concern as it could compromise the validity of results of this study.

		Count	Col %
how often do you use word processing for fun?	no pc (for word processing)	187	46.8%
	an hour or more	141	35.3%
	less than an hour	35	8.8%
	hardly ever	15	3.8%
	never	13	3.3%
	spoilt response	6	1.5%
	no response	3	.8%
Total		400	100.0%

Figure 17: A table indicating educators who use word-processing for fun

4.5.1.1 Using word-processing for fun at home

According to figure 17 on the left the majority of educators do not use

word processing for fun. The number of respondents who have no computers, (almost 47%) combined with those who hardly ever use this program, (almost 4%) and those who never use word-processing (33%) are indicative of this factor. Together, they make a total of almost 54%. Educators who are using word-processing for more than an hour and those who use it less than an hour make a total of 44%. Word-processing is a basic computer program and is used for almost all teaching, learning and school management purposes. Therefore it is noted with concern that a significant number of educators who teach in rural schools do not possess basic computer skills and are therefore not ready for e-Education.

4.5.1.2 Using word-processing for schoolwork

		Count	Col %
how often do you use word processing for schoolwork?	no pc (for word processing)	187	46.8%
	an hour or more	139	34.8%
	less than an hour	42	10.5%
	hardly ever	14	3.5%
	never	13	3.3%
	spoilt response	4	1.0%
	no response	1	.3%
Total		400	100.0%

Figure 18: A table showing frequency at which educators use word processing for schoolwork

There is a similarity between the results in table in figure 17 above and those in figure 18. Both deal with educators' use of word processing and they show that the majority of educators in rural schools do not use word-processing. Also, the figures representing those respondents who said they do not have computers (almost 47%) are consistent in both questions. When this number is combined with that of respondents who hardly use this program (almost 4%) and those who never use it (3.3%), it shows that the majority of 54% educators do not use this program. The educators who indicated that they use word-processing for more than an hour and those

who use it for less than an hour make a total of 45%. This suggests that fewer educators use this program. This is unfortunate since this program is the most basic computer program and it is imperative that educators know how to use it as they are at the forefront of the implementation of e-Education in the classroom.

4.5.1.3 Using spread sheet program for schoolwork

Figure 19 indicates that the majority of educators in rural schools do not use spreadsheet program for schoolwork. Almost 48% of the respondents do not have computers. It is noted though that this number is not similar to those educators who responded the same way in the previous question. However the difference is a small margin of only 2% and would have no significant effect on the results. If the number of respondents who do not have computers is combined with that of educators who said they hardly use this program and those who never use this program, they make a total of 56%.

		Count	Col %
how often do you use spreadsheet programs for schoolwork?	no pc (for spreadsheets)	191	47.8%
	an hour or more	103	25.8%
	less than an hour	69	17.3%
	hardly ever	18	4.5%
	never	13	3.3%
	spoilt response	2	.5%
	no response	4	1.0%
Total		400	100.0%

Figure 19: A table showing frequency at which educators use spreadsheet program for schoolwork

A combination of educators who use this program for an hour or more (almost 26%), and those who use it for less than an hour (17%), makes a total of 43%. These results therefore suggest that fewer educators are using this program. The spreadsheet program is often used for re-

cording learners' marks and this is a task educators perform all the time. Also, educators are likely to find the spreadsheet very convenient as it allows electronic for calculations. There are various other tasks for which both educators and learners could use this program e.g. in subjects such as Accounting and Business Studies. This program is also useful as a tool for school administration. Therefore it is noted with concern that most educators in rural schools do not use this program.

4.5.1.4 Using electronic references for schoolwork at home

According to figure 20 below almost 44% of respondents do not have computers. This figure again is inconsistent with the number of similar responses in the previous question as it reveals a margin of 5% between them. This makes it difficult for the researcher to determine the actual number or respondents who do not have computers. When the number of educators who responded to this question (they do not have computers) is combined with a little more than 9% who said they hardly use this function and 5% who never use this program, they constitute 58% educators who probably do not use this function.

		Count	Col %
how often do you use electronic references for schoolwork?	no pc (for electronic refernces)	175	43.8%
	an hour or more	78	19.5%
	less than an hour	79	19.8%
	hardly ever	37	9.3%
	never	20	5.0%
	spoilt response	4	1.0%
	no response	7	1.8%
Total		400	100.0%

Figure 20: A table showing frequency at which educators use electronic references for schoolwork at home

The educators who responded that they use this function for an hour or more polled almost 20% and those who never use it polled 5%. These make a total of 20%, which suggest that fewer educators use this function.

This could be an indication that educators in rural schools still rely on older methods of referencing such as hardcopy documents and dictionaries for seeking information. This is indicative of a very low level of e-Readiness.

4.5.1.5 Using e-mail for schoolwork at home

Figure 21 below shows that 45% respondents do not have computers. The educators who indicated that they hardly use e-mail for schoolwork polled almost 11% and those who said they never use this program polled 7%. If these two groups are added to the number of those educators who do not have computers, they make a total of 63% and this would suggest that the majority of educators in rural schools do not use e-mail for schoolwork.

		Count	Col %
how often do you use e-mail for schoolwork?	no pc (for e-mail)	178	44.5%
	an hour or more	44	11.0%
	less than an hour	94	23.5%
	hardly ever	42	10.5%
	never	28	7.0%
	spoilt response	4	1.0%
	no response	10	2.5%
Total		400	100.0%

Figure 21: A table showing frequency at which educators use e-mail for schoolwork

The e-mail is one of the more advanced technologies. It is also a quick and effective means of sharing information by sending each other teaching valuable and relevant teaching and learning material. The educators' ability to utilize the computer for communication with learners and among themselves is integral to effective teaching and learning and is an indication of e-Readiness. Therefore it is noted with concern that most educators do not use this program.

4.5.1.6 Surfing the Internet for fun at home

The results emanating from responses to this question show a low level of e-Readiness among educators in rural schools. The table in figure

22 shows that the majority of educators in rural schools do not use Internet for fun at home. This is indicated by the fact that 43% do not have computers and those who do hardly use this program and those who never use this program polled 22% and 6% respectively. Together these three groups indicate that a total of 71% educators are not using this program.

		Count	Col %
how often do you surf the internet for fun, looking for information?	no pc (for web surfing)	173	43.3%
	an hour or more	54	13.5%
	less than an hour	89	22.3%
	hardly ever	54	13.5%
	never	22	5.5%
	spoilt response	3	.8%
	no response	5	1.3%
Total		400	100.0%

Figure 22: A table showing educators' use of Internet for fun at home

The value of the Internet as a useful source of information cannot be emphasized enough. However Internet costs should be taken into consideration as it could be a factor contributing to its lack of use by educators

4.5.1.7 Surfing the Internet, looking for information for schoolwork at home

The results in figure 23 below show a similar pattern with those in figure 22 above. Both questions deal with the educators' use of Internet and both indicate that majority of educators in rural schools do not use the Internet. The table shows how educators responded to the question: *"How often do you surf the Internet looking for information for schoolwork?"*

		Count	Col %
how often do you surf the internet looking for information for schoolwork?	no pc (for web surfing)	169	42.3%
	an hour or more	56	14.0%
	less than an hour	90	22.5%
	hardly ever	51	12.8%
	never	23	5.8%
	spoilt response	4	1.0%
	no response	7	1.8%
Total		400	100.0%

Figure 23: A table showing frequency at which educators surf the Internet to look for information for schoolwork

Almost 43% of respondents said they do not have computers. This number is almost consistent with those educators who responded that they have no computers in the previous question. The number of educators who do have computers but hardly use the Internet is almost 13% and those who never use the Internet are almost 6%. These three groups make a total number of 62% of educators who do not surf the Internet for schoolwork. The educators who surf the Internet make a total of almost 37% if the number of those who use it for more than an hour and those who use it for less than an hour are combined.

These results would therefore suggest that educators who work in rural schools are not exposed to advance digital technology and therefore would not be in a position to use such technologies should they be made available in their schools. Internet cost however, should be taken into consideration as a contributing factor to this situation.

4.5.1.8 Using educational software for schoolwork at home

		Count	Col %
how often do you use educational software for schoolwork?	no pc (for educational programs)	170	42.5%
	an hour or more	89	22.3%
	less than an hour	72	18.0%
	hardly ever	42	10.5%
	never	18	4.5%
	spoilt response	1	.3%
	no response	8	2.0%
Total		400	100.0%

Figure 24: A table showing educators use of educational software for schoolwork at home

Figure 24 on the left shows that the majority of educators do not use this program. Almost 43% of respondents do not have computers. Those who hardly ever use this program polled 11% and those who never use it are almost 5%. When these three groups are combined they make a total of 59% educators who do not use this program at home. Educators who indicated that they use educational software for an hour or more and those who use it for less than an hour make a sizeable number of 40%. These figures therefore suggest that the majority of educators in rural schools do not use educational software at home.

Educational software provides both educators and learners with valuable information to supplement what is provided in prescribed textbooks and allows for further exploration of teaching and learning content. Therefore it is unfortunate that educators do not use this program, which is an indication that they are not yet ready for the implementation of e-Education as it involves integration of technology to teaching and learning activities in the classroom.

4.5.2 Educators' use of computer facilities at school

In this section, the study aims to establish e-Learning facilities that exist in rural public schools of KwaZulu-Natal in order to make informed recommendations that could be considered during implementation of the

e-Education policy. Respondents were requested to identify e-Learning facilities in their schools.

However, the researcher noted with dismay that responses to almost all questions in this section show that a significant number of educators, although not in majority, are not sure whether computers exist in their schools. This situation hinders the researcher's objective to find out what e-Learning facilities exist in rural public schools KwaZulu-Natal.

4.5.2.1 e-Learning hardware facilities available in rural schools

4.5.2.1.1 Multimedia devices

Figure 25 below shows that the majority of respondents, a little less than 56%, indicated that their schools have multimedia devices. Almost 25% indicated that these devices are not available in their schools and 11% said they were not sure.

		Count	Col %
do you have multimedia devices at your school?	no multimedia devices at my school	99	24.8%
	yes	225	56.3%
	no	24	6.0%
	i'm not sure	44	11.0%
	spoilt response	2	.5%
	no response	6	1.5%
Total		400	100.0%

Figure 25: A table indicating multimedia devices available in rural schools of KZN

This would suggest that multimedia devices such as radios, televisions, DVD and satellite TV are available in most schools in the rural areas. These devices form part of older technologies that have been around for some time and are useful teaching and learning tools. The use of multimedia in the classroom enhances effective teaching and learning. Therefore it

is imperative that educators are encouraged to use these resources to improve their performance in the classroom.

4.5.2.1.2 Free-standing computers

		Count	Col %
do you have any free standing computers at your school?	no freesstanding computers at my school	92	23.0%
	yes	134	33.5%
	no	46	11.5%
	i'm not sure	116	29.0%
	spoilt response	5	1.3%
	no response	7	1.8%
Total		400	100.0%

Figure 26: A table showing free-standing computers available in rural schools

Figure 26 shows that the majority of respondents, almost 34%, said that their schools have freestanding computers and 23% said there are no free standing computers at their schools. It is noted that a sizeable number of respondents (29%) said they are not sure whether these computers exist in their schools. When this group of educators is combined with those who said there are no such computers in their schools (23%) and those who said they have them but they are not used (almost 12%), it would seem that almost 64% have no access to computers at work.

When these results are compared with those from the previous section, which revealed that most educators do not have access to computers at home, they suggest that most educators in rural schools have little or no access to computers. This is unfortunate because computers form part of the latest and more advanced technology and are integral to the proposed e-Education policy. Therefore it should be impressed upon educators at schools where there are computers that they do not become white elephants and are utilized to enhance effective teaching and learning.

4.5.2.1.3 Networked computers linked to one another on an Intranet

The results in figure 27 below show that 23% of educators said there are no networked computers linked with intranet at their schools. However, when one considers the number of educators who said they are not sure, (28%), and those who said they do not use them (20%), they reflect a possibility that 71% of educators do not have access to such a facility in their schools. These results are consistent with those in figure 26 above and they both reflect the unfortunate situation of lack of computers in rural schools.

		Count	Col %
do you have any free networked computers linked to one another on an intranet, but not on internet at your school?	no intranet-linked computers at my school	92	23.0%
	yes	108	27.0%
	no	80	20.0%
	I'm not sure	111	27.8%
	spoilt response	3	.8%
	no response	6	1.5%
Total		400	100.0%

Figure 27: A table showing whether rural schools have computers linked to one another on an intranet

4.5.2.1.4 Networked computers linked to the Internet

According to figure 28 below almost 24% of respondents said there are no networked computers linked to an Internet in their schools. Another 20% said there are no such computers in their schools. Both these figures make 45%, which indicates that the majority of schools in rural schools do not have networked computers linked to the Internet.

		Count	Col %
do you have networked computers linked to the internet?	no internet-linked computers at my school	94	23.5%
	yes	85	21.3%
	no	80	20.0%
	i'm not sure	132	33.0%
	spoilt response	1	.3%
	no response	8	2.0%
Total		400	100.0%

Figure 28: A table indicating whether schools in the rural areas have networked computers linked to the Internet

It is again noted that the majority of respondents are not sure whether these facilities are available at their schools or not, and when these are combined with those two groups mentioned above, they give a total of 78% of educators who work in schools where there are no computers linked to the Internet. Again, this is indicative of educators' lack of exposure to the most valuable source of information considering that these educators also do not have access to Internet at home as indicated in previous section (4.5.1.7).

4.5.2.2 Computer software programs that are available and used in rural schools

The South African White Paper on e-Education (2004), reporting the current profile and distribution of ICT in South African schools, states that the teaching of basic computer principles and word processing skills forms the most important component in teaching of computer literacy in both primary and secondary schools. However, limited integration into teaching and learning is still evident. It is therefore necessary for the researcher to establish whether schools in the rural areas have computers and that educational computer software programs are available to teachers and learners. The educators were asked this question: *"What computer software programs are used in your school?"* This section shows how they responded to this question.

4.5.2.2.1 Word-processing software programs

Figure 29 below shows that almost 33% respondents indicated that they have computers at school and almost 24% said they are not sure. However, a bigger group of almost 39% said there are no computers at their schools and if this group is combined with those educators who are not sure and the 3% who indicated that they do not use this program in their schools, they make a total of 66% educators who are possibly not using this program at schools. The importance of using this program has been stated in the previous section (4.5.1.1), where results show similar evidence.

		Count	Col %
is word processing software used at your school?	no pc's at my school	154	38.5%
	yes	131	32.8%
	no	12	3.0%
	i'm not sure	93	23.3%
	spoilt response	7	1.8%
	no response	3	.8%
Total		400	100.0%

Figure 29: A table showing whether word-processing is used in rural schools of KZN

4.5.2.2.2 Drawing software programs

The results in figure 30 below indicate that most educators in rural schools do not use drawing software at school. This is illustrated by the fact that that almost 39% of respondents said that there are no computers at their schools. Another 27.3% said they use computer software for drawing in their schools and 5.0% indicated that they do not use computer software for drawing in their schools. If the number of respondents who said there are no computers in their schools is combined with that of educators who indicated that they do not use drawing software in their schools, it gives a total of 72%. Therefore it is highly possible that drawing software is not used in majority of rural schools.

		Count	Col %
is drawing software used at your school?	no pc's at my school	154	38.5%
	yes	109	27.3%
	no	20	5.0%
	i'm not sure	112	28.0%
	spoilt response	2	.5%
	no response	3	.8%
Total		400	100.0%

Figure 30: A table indicating whether educators use drawing software at school

It is also noted that a sizeable percentage of 28% of respondents indicated that they are not sure whether this program is used in their schools. This suggests that some educators in rural schools have no idea what educational resources are available at their schools.

4.5.2.2.3 Spreadsheet programs

The results presented in figure 31 show that very few schools are using the spreadsheet program. This is indicated by the number of educators who said there are no computers in their schools, (almost 40%), and those who said there are computers in their schools but this program is not used (almost 7%). Both these groups make a total of 47%. Another 30% indicated that the spreadsheet program is used in their schools and 23% of respondents are not sure whether this program is used in their schools or not. The spreadsheet is suitable for recording learners' marks or levels of achievement and educators would use this program more frequently for this particular purpose. It should be noted that the majority of educators do not use this program at home either, as indicated in the previous section; (4.5.1.3). The fact that very few schools use this program indicates low level of educator e-Readiness.

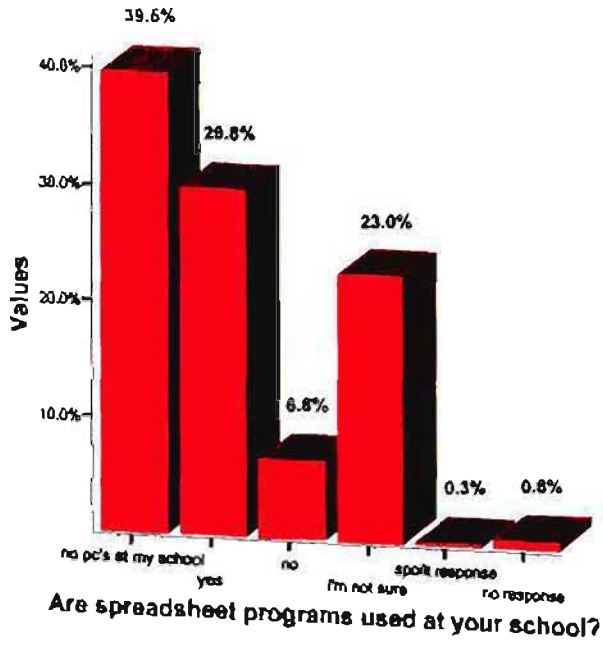


Figure 31: A bar graph indicating whether educators use spreadsheet programs in rural public schools of KZN

The spreadsheet is a useful program and it enables educators to do a variety of teaching and learning tasks and it is also useful for administration purposes. Therefore it is unfortunate that it is not utilized in most schools, more so because educators do not use this program at home either.

4.5.2.2.4 Electronic references

According to figure 32 below educators who said their schools do not have computers polled almost 39% and almost 23% of respondents indicated that electronic references are used in their schools. A further 11% indicated that this program is not used in their schools and almost 26% indicated that they are not sure if electronic references are used in their schools.

		Count	Col %
are electronic references used at your school?	no pc's at my school	155	38.8%
	yes	90	22.5%
	no	44	11.0%
	i'm not sure	103	25.8%
	spoilt response	1	.3%
	no response	7	1.8%
Total		400	100.0%

Figure 32: A table showing the use of electronic references in rural public schools of KwaZulu-Natal

The ability to use electronic references requires more than basic computer skills, therefore the fact that only 23% respondents said this is used in their schools shows that educators in rural schools have not acquired advanced computer skills and this indicates a low degree of e-Readiness.

4.5.2.2.5 E-mail

Figure 33 shows how respondents answered the question on whether e-mail is used in their schools. Almost 38% respondents indicated that there are no computers at their schools, 12% indicated that e-mail is used in their schools and 26% were not sure whether it is used in their schools or not.

		Count	Col %
is e-mail uesd at your school?	no pc's at my school	151	37.8%
	yes	49	12.3%
	no	87	21.8%
	i'm not sure	105	26.3%
	spoilt response	4	1.0%
	no response	4	1.0%
Total		400	100.0%

Figure 33: A table indicating whether e-mail is used in rural schools

The combination of figures indicating educators who said their schools do not have computers and those who said they do not use this program at their schools makes a total of 60%. Again a sizeable number of a little more than 26% of respondents said they are not sure whether this program is used at their schools and if this is added to 60%, it constitutes a total of 86% of educators who are possibly not using this program at school. Results shown in the table indicate that only 12.3% respondents said e-mail is used in their schools. If the use of e-mail is compared with that of telephone, responses to that question (figure 12 in section 4.4.1), indicate that telephone is still more preferred than e-mail. It is also cheaper than e-mails and does not require a computer for use. Therefore many schools in the rural areas can afford a telephone. That could explain the small number of respondents who indicated that e-mail is used in their schools in figure 33 above.

4.5.2.2.6 Database programs

		Count	Col %
is database software used at your school?	no pc's at my school	159	39.8%
	yes	103	25.8%
	no	36	9.0%
	i'm not sure	96	24.0%
	spoilt response	2	.5%
	no response	4	1.0%
Total		400	100.0%

Figure 34: A table indicating whether database software is used in rural schools in KZN

The database program is useful for record-keeping which is part of day-to-day activities at school. It is convenient for schools to have such a program. However results in figure 34 above indicate that most schools do not use it. Almost 40% of educators said there are no computers in their schools and 24 % are not sure whether their schools have this software or not. Another 9% said they do not use this software at their schools and if they are added to these other two groups they make a total of 73% educators who may not be using this software at their schools. Those educators who indicated that they definitely use this software at school are only 25% and this indicates a low level of e-Readiness.

4.5.2.2.7 Surfing the Internet to look for information

The results in figure 35 below reveal that almost 37% of respondents said there are no computers in their schools and almost 10% said they do surf the Internet to look for information. A sizeable number of educators (28%) are not sure whether their schools have this facility.

		Count	Col %
do you surf the net looking for information at your school?	no pc's at my school	147	36.8%
	yes	39	9.8%
	no	95	23.8%
	i'm not sure	112	28.0%
	spoilt response	2	.5%
	no response	5	1.3%
Total		400	100.0%

Figure 35: A table illustrating educators who surf the net for information

The bigger group is that of educators who work in schools where there are no computers and if they are combined with those that are not sure and those who do not use this program, they make a total of 90%. This is a large percentage of educators who do not use Internet. Only a small percentage of almost 10% said they surf the Internet at school. Internet costs should also be considered as a contributing factor in this case. In the previous section, the question regarding the use of Internet extracted almost similar responses. This could be an indication that the majority of educators who work in rural schools have no access to the Internet both at home and at school. This fact is noted with great concern considering the importance of the Internet as a valuable source of information. .

4.4.2.2.8 Educational software

Figure 36 below shows how the respondents answered the question: *"Is educational software used in your school?"* This refers to software for Mathematics, Science and commercial subjects, etc. It shows that 37% of respondents said their schools do not have computers; 13.3% use educational software at their schools. A substantial number of respondents indicated that they are not sure whether educational sofrware is used in their schools (31.0%) and if this group is combined with those educators who said there

are no computers at their schools and those who do not use educational software, it makes a total of 85% educators who do not use educational software. This may require further investigation to discover whether computers are utilized effectively in those schools that are equipped with this facility.

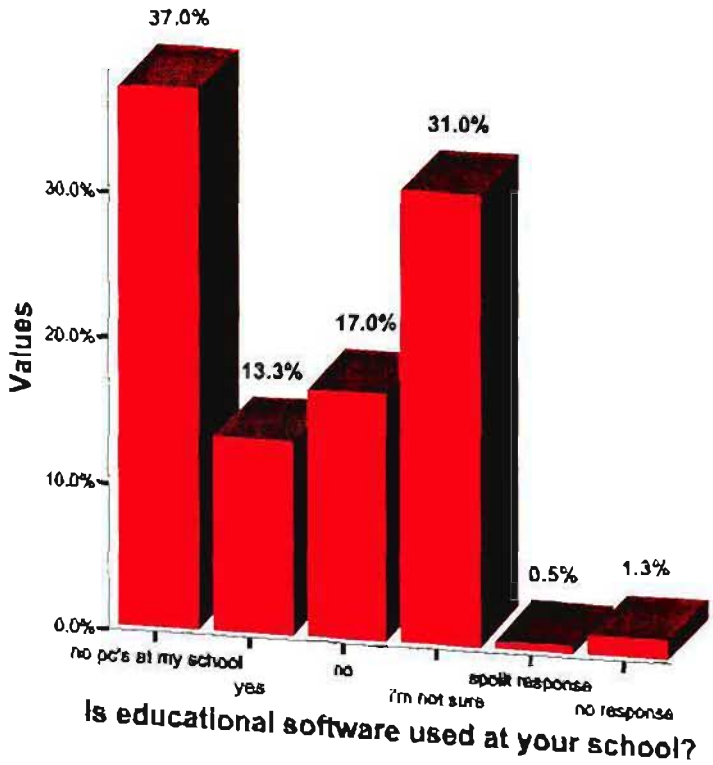


Figure 36: A bar graph illustrating the use of educational software in rural schools of KZN

4.5.3 Summary of educators' adoption of more advanced electronic communication technologies at home and at school

The pattern emerging from responses in this section shows that although the majority of educators do not have computers at home, a size-

able number have one computer and a few have more than one computer, (4.5.1). However theses results reveal some inconsistency with the degree of computer usage among educators. Responses to most questions relating to how often educators use computers to access some computer programs revealed that the majority of educators said they do not use these programs because they do not have computers. This inconsistency hampers attempts to establish the level of educators' e-Readiness in relation to their exposure to more advanced information technology.

However, when the significantly large number of educators who indicated that they do not have computers is combined with those who said they hardly use computers, and those who said they never use computers, the total figures suggest that the majority of educators in rural schools of KwaZulu-Natal do not have access to advanced communication technologies both at home and at school. The results show a smaller number of educators who have computers and are using them. This reveals a low level e-Readiness among educators in rural schools.

Another disturbing pattern emerges from this section in relation to computer software available in rural schools. A significant number of educators are not aware of software programs that are available at their schools. For instance, almost 33% respondents (figure 29) said they use word-processing at school, but 23% indicated that they are not sure whether this software program is available in their schools. Also, almost 30% of educators indicated that they use spreadsheet programs at school but 23.0% said they are not sure whether their schools have this program (figure 31). A similar pattern is evident from other programs like database and drawing software. This again frustrates the researcher's efforts to establish computer hardware and software available in rural public schools.

However, despite the above-mentioned concerns, it is encouraging to note that 56% of educators indicated that multimedia devices like radio, television and videos are available in their schools as this would suggest that

poor schools that cannot afford computers have access to basic electronic devices that can be used to enhance effective teaching and learning.

4.6 THE LEVEL OF RESPONDENT'S COMPUTER SKILLS AND COMPUTER QUALIFICATIONS

Hu et *al.* (2003) points out that teachers need to develop a positive attitude towards technology in order for a country to realize the technology-empowered teaching and learning that is advocated by IT specialists and visionary educationists.

This section aims to establish the level of computer skills and computer literacy qualifications that educators in rural schools have acquired. This will assist in an attempt to establish the level of training or retraining educators may have to undergo to enable them to use ICT for e-Education in rural schools.

		Count	Col %
how much informal instruction/training have you had in computer literacy?	leraner - basic	1	.3%
	educator - advanced	27	6.8%
	eductaor - intermediate	156	39.0%
	educator - basic	158	39.5%
	educator - none	46	11.5%
	spoilt response	1	.3%
	no response	11	2.8%
Total		400	100.0%

Figure 37: A table showing level of informal computer training that educators have undergone privately at their own initiative

Figure 37 above shows responses to the question, "*How much computer training have you undergone privately in your own initiative?*" The results show that almost 5% of respondents have undergone advanced computer literacy training and almost 36% intermediate training. Further 44.3% respondents indicated that they have undergone basic computer literacy training and almost 9% have no training. It is interesting to note that the majority of edu-

cators in rural schools realize skills demand in digital age and have taken the initiative to equip themselves with such skills. However it is of great concern that most educators never get to use their skills, as indicated by results in previous sections on the use of different computer programs and software. It is imperative that technological resources are put in place in schools to enable educators to make use of skills they have acquired.

The results in figure 38 below show how respondents answered the question, *"How much computer literacy training have you undergone as part of your higher education?"* The results indicate that 5% respondents have undergone advanced literacy training as part of higher education and almost 53% have undergone intermediate training. A further 23% have undergone basic literacy training and 7% indicated that they have not undergone any computer literacy training as part of higher education.

		Count	Col %
how much literacy training have you undergone as part of your higher education ?	advanced	20	5.0%
	intermediate	211	52.8%
	basic	92	23.0%
	none	28	7.0%
	spolit response	2	.5%
	no response	47	11.8%
Total		400	100.0%

Figure 38: A table showing educators' literacy training as part of their higher education

Although the percentage of those educators who have acquired advanced training is low, educators with intermediate computer training (almost 59%), and those with basic computer training (23%), constitute a substantial number. This would suggest that a significant number of educators have received computer training and this is indicative of some level of e-Readiness. However, educators need to be encouraged to utilize these skills to improve the quality of teaching and learning in class, considering that

results from this study indicate that this not happening at most rural public schools of KwaZulu-Natal.

Figure 39 below shows responses to the question," *How much formal training has the KZN DoE provided to you in computer literacy as part of your core teaching responsibilities?*" The results show that almost 11% of respondents received advanced formal training in computer literacy provided by KZN DoE. A further 41% received intermediate training, 23% received basic training. Those who have received no training from KZN DoE polled 22%.

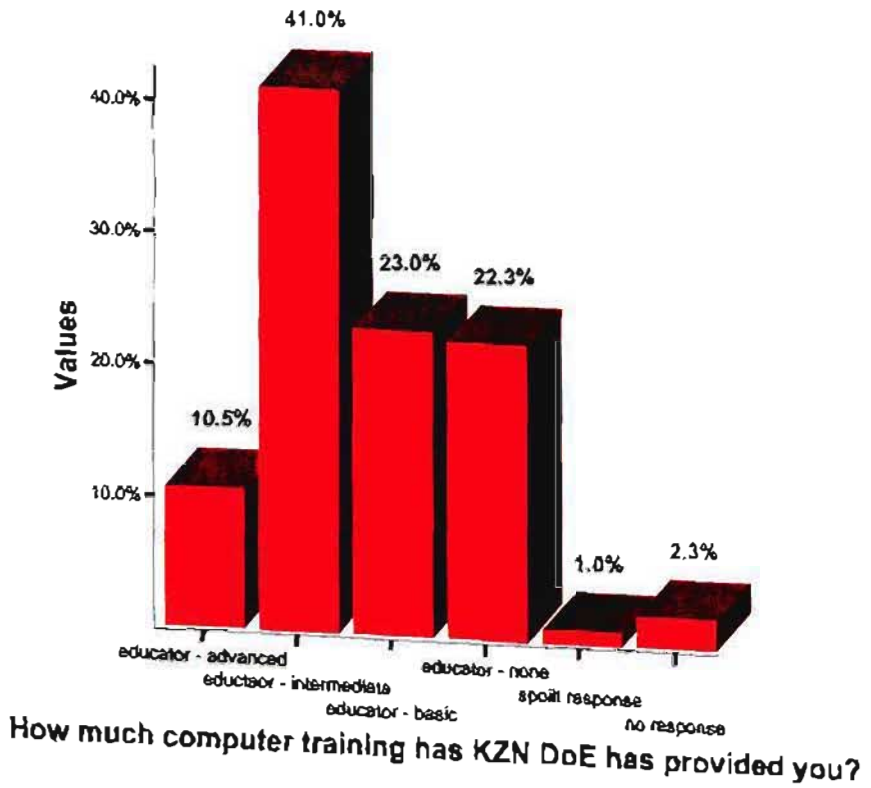


Figure 39: A bar graph showing the level of formal computer training respondents received from the KZN-DoE

These results suggest that the KZN DoE has provided some computer literacy training to educators in rural schools, considering the total number of those who stated that they received advance, intermediate and basic training respectively, which amounts to 75%. However it is noted with concern that having provided such training, the KZN-DoE has yet to provide resources to enable educators to utilize the skills they have acquired. This impedes the efforts to use technology to bring about quality education. The need to encourage educators to utilize their skills effectively cannot be emphasized enough especially those who work in schools that have necessary facilities.

Figure 40 below shows how rural educators responded when they were asked to mark all forms of e-Education for which their computer experience has prepared them. Slightly less than 23% respondents said that they find it useful in preparing learning material for learners. Lesson preparation is educators' daily task and it is highly possible that a high number of educators would find using computer more convenient for this task. Those who marked the combination of preparing learning material and record keeping also have a high score almost of 17% compared to other programs. Both these are basic educator's duties that educators perform all the time as part of their teaching tasks and this may explain this response. A sizeable percentage of almost 18% respondents also indicated that they send and receive electronic memos in their schools.

		Count	Col %
which of the following forms of e-education has your computer experirnce prepared you for?	no training	53	13.3%
	preparing leraning materials	89	22.3%
	record keeping	50	12.5%
	e-mail	1	.3%
	sending and receiving electronic notices and memos in school	75	18.8%
	multimedia presentations in class	2	.5%
	preparing learning materials & Record keeping	66	16.5%
	prep learng materls & sending and receivng electrnic notces	18	4.5%
	record keeping & sending/ recvng electr notces	4	1.0%
	snding / rcvng elctrnic ntices/ memos in schl & multim prsns	1	.3%
	snding / rcvng elctrn ntics/ mms in schl & multi prsns lntrn	2	.5%
	prep learng materls, record keeping, e-mail,multimedia prese	2	.5%
	prep learng materls,rec. keep,multi ppp,send rcvng,mult.inte	3	.8%
	spoilt response	3	.8%
	no response	31	7.8%
Total		400	100.0%

Figure 40: A table showing forms of e-Education for which respondents feel their computer training has prepared them.

4.6.1 Summary of level of respondents' computer skills and qualifications

The responses in this section reveal that educators in rural schools have received some training in computer literacy. There are very few who have had no training at all. It is also noted that a substantial number of

educators have undergone computer training voluntarily at their own initiative. This could be an indication that educators are aware of the demands brought by new developments in education as the country moves towards becoming part of the digital world. Other educators obtained computer training as part of higher education.

It is however noted with concern that despite the computer training that educators have undergone and skills they have acquired most have not been able to utilize these skills to enhance the quality and reach of their teaching. This is indicated by responses in section 4.5.1 whereby educators provided information about computer programs and software they use at home and at school. Results from responses in this section indicate that the majority of educators are not using computers either at home and or at school.

The results also show that the KZN-DoE has provided computer training for educators; however it has is yet to provide necessary resources to enable educators to utilize their acquired skills. The researcher however is not ignoring the fact that the proposal by the South African Department of Education to introduce e-Education aims to address this very problem.

4.7 RESPONDENTS' PERCEPTIONS ON THE USE OF ICT IN RURAL SCHOOLS

According to the South African White Paper on e-Education (2004), the advent of ICT has had an impact on the curriculum and education delivery and it continues to pose challenges for educators around the world. McConnell Institute (2001) point out that technology acceptance is one of the rankings used to assess the level of e-Readiness of different countries. This ranking considers the population's e-Literacy based on its experience in using the Internet and its *receptivity* to technology. This section aims to establish the degree in which teachers have accepted technology and their willingness to use ICT in the classroom in rural schools.

Figure 41 below shows how educators responded to the question, "*How would you feel about working on projects and linking with other oversees schools on the Internet?*" The majority of respondents 62.0% indicated that it would be excellent and a substantial number of respondents 34.0% said it would be good. It is encouraging to note such positive attitude that educators display towards the use of technology. This indicates that the educators realize the potential for the Internet to bring the entire world closer to the children in rural schools and its ability to provide educators with wealth of knowledge that can be used to improve the quality of teaching and learning in the classroom.

		Count	Col %
how would you feel about working on projects and linking with other overeseas schools on the intrenet?	excellent	248	62.0%
	good	136	34.0%
	bad	6	1.5%
	very bad	2	.5%
	spoilt reponse	2	.5%
	no response	6	1.5%
Total		400	100.0%

Figure 41: A table showing educators' perceptions on the use of Internet working on projects linking them to schools abroad.

The respondents were also asked, *"How would you feel if you could use a direct two-way TV link with other schools to take part in debates and quizzes?"* Their responses to this question are shown in the table in figure 42 below.

		Count	Col %
how would you feel if you could use a direct two way TV link with other schools to take part in debates and quizzes?	excellent	245	61.3%
	good	144	36.0%
	bad	3	.8%
	very bad	2	.5%
	spoilt reponse	2	.5%
	no response	4	1.0%
Total		400	100.0%

Figure 42: A table showing how educators feel towards the use of a to-way TV link with other schools.

Again it is noted that a significant majority of educators 61% feel that it would be excellent and substantial number of respondents 36.0% feels it would be a good idea. Those who felt it would be bad polled only 0.8% and those who felt it would be very bad polled 0.5%. This analysis is encouraging because TV is one of the older technologies that have been around for some time and its value, as a communicative tool cannot be underestimated. Also, TV is not very expensive and some schools in the rural areas can afford a few.

		Count	Col %
how would you feel if your school could get access to a tv channel on which subjects are taught during school hours?	excellent	257	64.3%
	good	136	34.0%
	bad	1	.3%
	very bad	1	.3%
	spoilt reponse	1	.3%
	no response	4	1.0%
Total		400	100.0%

Figure 43: A table showing how educators feel about their schools getting access to a TV channel where subject are taught during school hours

Figure 43 above shows responses to a question about how educators would feel if their schools get access to a TV channel on which subjects are taught during school hours. The results show that a sizeable majority of 64% respondents feels that it would be excellent and 34.0% indicated it would be good. Those who felt it would be bad and those who felt it would be very bad polled 0.3% respectively.

These results are similar to those shown in figure 42 above and they both show educators' positive attitude towards the use of television. This could be an indication that educators in rural schools recognize the efficacy of television to improve the level of teaching and learning and therefore would be receptive of such facilities should they be provided in their schools. This could also benefit learners because TV provides special broadcasts of specially prepared lessons for all grades and teaching guides to assist educators to improve their performance in class.

Figure 44 below shows how educators responded to the question, *"How would you feel if you could use electronic libraries on the Internet to read electronic books?"* The results indicate that almost 65% respondents feel it would be excellent, almost 34% feel it would be good.

		Count	Col %
how would you feel if you could use electronic libraries on the interent to read elecronic books?	excellent	259	64.8%
	good	135	33.8%
	bad	2	.5%
	no response	4	1.0%
Total		400	100.0%

Figure 44: A table showing educators' use of electronic libraries on the Internet

These results suggest that educators have positive attitude towards the use of advanced communication and information technologies and could be an indication that educators would be receptive of such facilities should they be made available in their schools. The results from previous

sections in this chapter revealed that the majority of educators in rural public schools do not have access to computers. They also revealed that even those educators who have received computer training have not been able to utilize their skills. This situation could be attributed to the lack of such resources in rural schools and not fear of technology, which Demetriadis *et al* (2003) refers to as *technophobia*.

4.7.1 Summary of respondents' perceptions on the use of ICT in rural schools

A significant pattern emerging from responses in this section reveals that educators in rural schools have a positive attitude towards the introduction of ICT in schools in KZN. The results of the survey suggest that they would embrace the idea of having e-Learning facilities in their schools. For instance, the majority of educators (64%) said having a TV channel where subjects are taught during school hours would be an excellent idea and almost 34% said it would be good. This could be an indication that television is still regarded as an effective e-Learning tool and suitable for most rural schools because of its low cost of access and maintenance when compared to computers. Also, a substantial number of educators revealed that they would like to be linked to other schools through two-way TV link. They felt this would be an excellent idea.

This positive attitude among educators towards the use of electronic technologies reveals their technology acceptance and willingness to embrace technological innovations should they be provided in their schools. The results from previous sections in this chapter reveal that the majority of educators in rural public schools do not have access to computers. They also show that even those educators who have received computer training have not been able to utilize their skills. This situation could be attributed to the lack of such resources in rural schools and not educators' technophobia

4.8 EDUCATORS' USE OF CELL PHONES AS INDICATION OF E-READINESS

This part of the survey is a separate follow-up survey on how educators have adopted cell phones as information communication instruments and to what uses they put cell phones. Where the main survey on how educators adopted computers for the purpose of e-Education surveyed 400 respondents, this survey uses the responses of a different group of 200 educators. This implies that the researcher cannot directly draw comparisons between computer adoption and cell phone adoption as indications of e-Readiness among educators.

The researcher also wishes to state that she personally supervised this survey and assisted educators with answering questionnaires. This helped to eliminate inconsistencies in responses elicited by this survey. Against this backdrop the researcher decided it is appropriate to run statistical significance tests to interpret data.

4.8.1 Background

The cell phone first made its appearance in South Africa in the 1990s and it has been widely used ever since. It comes in different types like the basic cell phone which allows the user to make and receive calls and short messages and also advanced ones that feature more functions like taking photos, videos, music videos, internet services etc.

This section aims to establish the extent at which the cell phone has been adopted by educators in the rural schools and the impact it has had in their level of e-Readiness. It also seeks to establish whether cell phone usage has prepared educators for the technological innovations that the South African Department of Education is proposing for education in South African schools.

4.8.2 Demographic profile of respondents to the cell phone survey

This section deals with demographic profile of educators that were targeted for this survey. Here the researcher looked at factors like, gender, residential area, and type of school and rank of educators.

4.8.2.1 Age of respondents

The age group ranges are classified as (20-34) for young adults, (35-45) for matured adults and (45 or more) for senior adults. According to figure 45 the majority of respondents, almost 35%, are mature adults. Young adults polled 29% and senior adults polled only 3%.

		Count	Col %
Your age	young adult	58	29.0%
	mature adult	69	34.5%
	senior adult	6	3.0%
	no response	67	33.5%
Total		200	100.0%

Figure 45: A table showing age of respondents survey on cell phone usage

These results reflect that most educators still in the employ of Kwa-Zulu-Natal DoE are matured adults between the ages of 35 and 45. However young adults also constitute a sizeable number. The small percentage of 6% regarding senior adults could be an indication that most educators in that age range have left through retirement.

It is also noted with concern that a sizeable number of almost 34% educators decided not to respond. This aim of this study is to establish educators' attitudes and perceptions towards transformation in education. This entails peoples' willingness to accept change and age could be influence peoples' attitudes towards change. Therefore it would be ideal for this study that all targeted educators respond to this question.

4.8.2.2. Gender of respondents

Figure 46 below shows that the majority of educators working in rural public schools of KwaZulu-Natal are females. These polled almost 51%. Male educators polled almost 42%. Almost 8% chose not to answer this question.

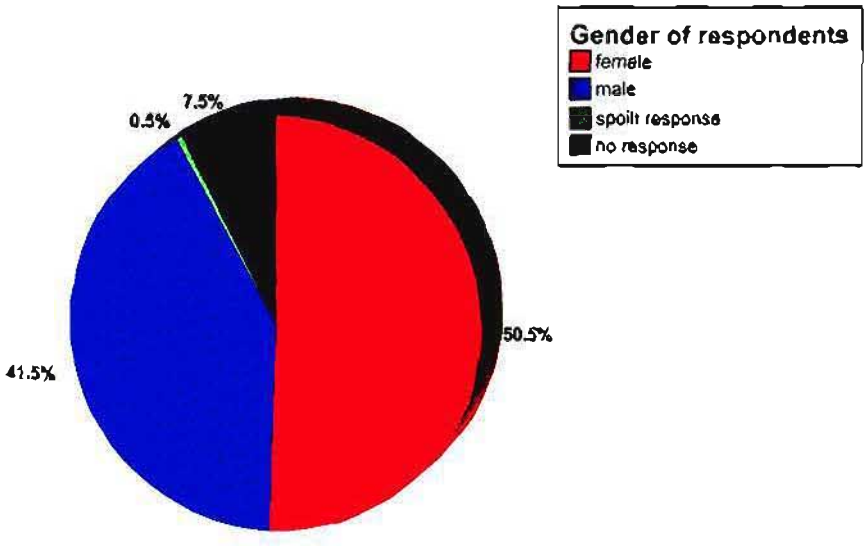


Figure 46: A pie graph showing gender of educators in rural public schools of KwaZulu-Natal.

Although there is a margin of 9% between males and females, and that 7% did not want to reveal their gender, this is still an acceptable representation of gender distribution of educators in rural public schools and it is suitable for this study.

4.8.2.3 Rank of educators

The results in figure 47 below shows that the majority of educators targeted for this survey occupy Level 1 position, which is entry level. They polled a significant majority of 72%. Heads of Department are almost 13%,

Deputy Principals 3% and Principals only 1%. This is a fair distribution of educators in managerial positions considering the sample of 200 schools that were targeted for this study. Also the researcher noticed that principals at most of the targeted schools visited allowed survey to be conducted in their schools but shied away from completing the questionnaires citing various reasons.

		Count	Col %
Your rank	level 1 educator	144	72.0%
	head of department	25	12.5%
	deputy principal	6	3.0%
	principal	2	1.0%
	no response	23	11.5%
Total		200	100.0%

Figure 47: A table showing rank occupied by educators in rural public schools of KwaZulu-Natal

4.8.2.4 Residential area of respondents

According to the results in figure 48, the majority of educators live in the urban areas and 19% live in the rural areas. This shows that although educators work in rural areas they live in the urban areas. Lack of facilities, which is prevalent in rural areas, could be the factor that drives educators away from the rural areas.

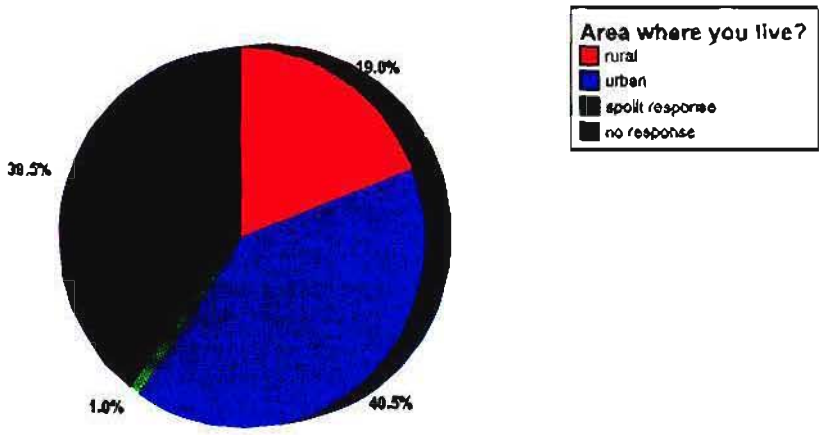


Figure 48: A pie graph showing respondents' residential area

It should be noted that a sizeable number of respondents (almost 39%) decided not to respond to this question. This researcher has noticed with concern the tendency among respondents to ignore questions relating to age (as shown in figure 45) and residential area (as indicated in figure 48) and this factor may warrant further investigation.

4.8.2.5 Number of cell phones respondents own

Figure 49 the majority of respondents own one cell phone each. A further 31% own two or more cell phones. Only 1% own three or more cell phones.

		Count	Col %
How many cell phones do you personally own?	one	131	65.5%
	two	62	31.0%
	three or more	2	1.0%
	no response	5	2.5%
Total		200	100.0%

Figure 49: A table showing number of cell phones owned by respondents

Cell phones form part of recent and more advanced communication technology and the fact that educators

have access to cell phones means that educators are exposed to advanced technology and it indicates some level of e-Readiness among educators in rural schools.

4.9.2.6 Type of cell phones respondents own

		Count	Col %
Do you own a basic, intermediate type or advanced cell phone?	basic	22	11.0%
	intermediate	20	10.0%
	advanced	97	48.5%
	unsure	52	26.0%
	spoilt response	4	2.0%
	no response	5	2.5%
Total		200	100.0%

Figure 50: A table showing types of cell phones owned by educators

The results in figure 50 on the left show that the majority of almost 49% respondents own advance cell phones. Those who own basic and immediate cell phones polled 10% and 11% respectively. These results could be a reflection of fast growing advancement in technology where new and more advanced cell phones are brought into market. Users are likely to upgrade contracts and obtain more advanced cell phones. Advanced cell phones allow a variety of interesting and more convenient functions that could be useful in communication for educational purposes. It is noted therefore that educators are not being left behind and are becoming more exposed to new and advanced communication technology. This factor contributes to educators' level of e-Readiness.

4.9.2.8 Frequency at which respondents' cell phones have been stolen

Figure 51 below shows that a significant number of educators have lost their cell phones through theft. A combination of educators who have had their cell phones stolen once (almost 44%) and those whose cell phones have been stolen twice or more (15%) make a total of 59%.

		Count	Col %
How many times has your cell phone been stolen?	never before	29	14.5%
	once	87	43.5%
	twice or more	30	15.0%
	spoilt response	4	2.0%
	no response	6	3.0%
	unsure	44	22.0%
Total		200	100.0%

Figure 51: A table showing frequency at which educators' cell phones have been stolen

These results suggest that there is high prevalence of cell phone theft. Although various safety measures have been introduced to prevent this crime, users still fall prey to cell phone thieves. However it is interesting to note that this has not discouraged educators from buying advanced cell phones as indicated in figure 50.

4.9.2.9 Cell phone reception where respondents live

		Count	Col %
How is the cell phone reception where you live?	good	164	82.0%
	accceptable / it varies	15	7.5%
	poor	1	.5%
	spoilt response	3	1.5%
	no response	6	3.0%
	usure	11	5.5%
Total		200	100.0%

Figure 52: A table showing cell phone reception where educators live

The results in figure 52 show that a significant majority of respondents said there is good cell phone reception where they live. This is compatible with results in figure 48 that shows that majority of educators live in urban areas where there is good cell phone reception because of availability of technology infrastructure.

4.9.2.10 Cell phone reception where respondents work

Figure 53 below show that the majority of educators indicated that there is good cell phone reception where they work. These polled 81%. Only a small percentage said it is poor and they polled only 5%. Those who said it is acceptable or it varies are almost 7%.

		Count	Col %
How is the cell phone reception where you work?	good	162	81.0%
	accceptable / it varies	13	6.5%
	poor	10	5.0%
	no response	4	2.0%
	unsure	11	5.5%
Total		200	100.0%

Figure 53: A table showing cell phone reception where educators work

A similar pattern is noted between responses to this question and the question regarding cell phone reception where educators live, (figure 48). The educators targeted in this survey work in rural schools and these results show that there is also no problem of reception in these areas. This is contrary to what one would expect considering lack of infrastructure that is prevalent in the rural areas.

4.8.3 Summary of demographic profile of respondents

The responses in this section show acceptable gender representation of educators in rural schools public schools. Although the majority is females and they are separated by a small margin from males. Also, the researcher noticed a tendency among respondents of ignoring questions relating to age and residential area. These questions registered a sizeable number of no responses. For instance, the question about age polled almost 34% of no responses, (figure 45). Also, the question about residential area (figure 48) registered almost 39%. This factor may warrant further investigation.

An interesting factor noted in this section is that the majority of educators who work in rural schools own more advanced cell phones that al-

low them to access a variety of functions convenient for communication, business and entertainment. This is an indication that they are already exposed to advance communication technology and this increases their level of e-Readiness.

4.8.4 Educators' use of cell phone for everyday communication

The results discussed in this subsection show the frequency at which educators use cell phones to communicate on daily basis. This includes basic functions like making and receiving calls and short messages.

4.8. 4.1 Using cell phone to make and calls

Figure 54 below show that a large majority of respondents use cell phones to make and receive calls regularly. Those who make and receive calls regularly are 80% and 73% respectively. The respondents who make and receive calls only occasionally polled almost 20% and almost 24% respectively.

		Count	Col %
How often do you use your cell phone to make phone calls?	regularly	160	80.0%
	sometimes	39	19.5%
	rarely	1	.5%
Total		200	100.0%

		Count	Col %
How often do you use your cell phone to receive phone calls?	regularly	146	73.0%
	sometimes	47	23.5%
	rarely	2	1.0%
	spoilt response	4	2.0%
	no response	1	.5%
Total		200	100.0%

Figure 54: Two tables showing comparison between educators' use of cell phone for making calls and receiving calls

These are the most basic cell phone functions and that could account for its most frequent use among respondents. Making calls using a cell phone is more expensive than landline phone, however, it is more conven-

ient in the sense that the user does not need to be at a specific location (e.g. home or office) to make or receive calls. It allows users to communicate with people wherever they are. Therefore users are likely to use it more often than landline phones.

4.8.4.2 Using cell phone to receive SMSs from individuals

According to figure 55 below the majority of respondents (52%) use this facility on regular basis. However this is a rather small majority considering the fact that this is a free service. The respondents who said they sometimes use cell phones to receive SMS from individuals polled 25% and 15% said they rarely use this facility. Again this is surprising considering that the SMS facility is cheaper compared to making calls. This suggests that cell phone users prefer making and receiving calls because this allows them to have two-way conversation with the people they are calling.

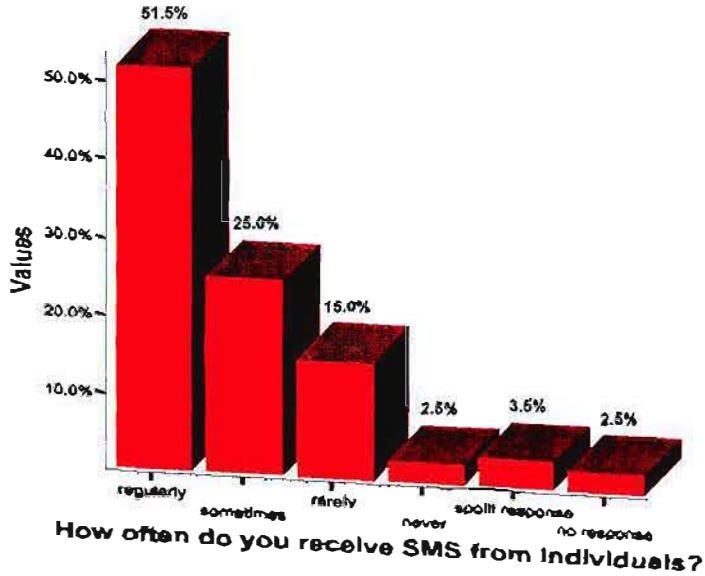


Figure 55: A bar graph showing frequency at which educators use cell phone to receive SMS from individuals

4.8.4.3 Using cell phone to send SMS to groups

The results in figure 56 below show that the majority of almost 35% educators responded that they send SMS to groups regularly. Almost 25% indicated that they rarely use this facility and almost 24% indicated that they never use it.

When these results are compared with those in figure 55 above, they suggest that educators are not keen on using the SMS facility even though it costs less than making calls. This function is even cheaper than sending SMSs to individuals because it allows you to send SMS to multiple recipients at similar cost.

		Count	Col %
How often do you use your cell phone to send SMS messages to multiple recipients?	regularly	69	34.5%
	sometimes	30	15.0%
	rarely	49	24.5%
	never	47	23.5%
	spoilt response	2	1.0%
	no response	3	1.5%
Total		200	100.0%

Figure 56: A table showing frequency at which educators use cell phones to send SMS to multiple recipients

4.8.5 Summary on cell phone use for everyday communication functions

The responses to all questions in this section indicate that making and receiving calls are the most frequently used by educators. Sending and receiving SMSs is also frequently used. The reason could be the fact that these are the cheapest form of cell phone communication functions and are available from any kind of cell phone. This is encouraging, considering that these functions can be used for educational purposes whereby educators could send important messages to learners and learners themselves could communicate with each other at less or no cost.

It is also noted that a large majority of educators receive calls on regular basis. The reason could be that receiving calls is a free service and it is also convenient as it allows users to locate and contact people anytime and anywhere without any costs. Overall, all functions discussed in this section are frequently used by the majority of educators. Educators could be encouraged take advantage of these free and low cost services and utilize them for educational purposes.

4.8.6 Using more advanced communication functions

This subsection deals with the use the cell phones to perform more advanced communication functions. These include e-mails, sending videos, birthdays and Christmas messages.

4.8.6.1 Using cell phone to send and receive e-mails

		Count	Col %
How often do you use your cell phone to send and receive email messages?	regularly	131	65.5%
	sometimes	40	20.0%
	rarely	9	4.5%
	never	14	7.0%
	spoilt response	4	2.0%
	no response	2	1.0%
Total		200	100.0%

Figure 57: A table showing frequency at which educators use cell phones to send and receive e-mails.

The results in figure 57 illustrate the frequency at which respondents use their cell phones to send and receive e-mails. It shows that the majority of respondents, which polled 64.0%, indicated that they use this function on regular basis and 25.0% sometimes use it. Only a small percentage of 1.0% indicated that they rarely use this function.

The e -mail is a widely used facility in the corporate world where ICT has been adopted over the years and now forms an integral part of day-to-day business activities. The aim of researching the use of cell phone e-mail

among rural educators therefore becomes imperative in order to establish whether it can be used in schools as a communication tool between educators and learners and for school administration purposes. However e-mail is a more advanced function and therefore restricts the user to communicate with only those users who own more advanced cell phones.

4.8.6.2 Using cell phone to send birthday wishes

Figure 58 below illustrates that the majority of respondents use cell phones to send birthday wishes. However it is also noted that a significant number of respondents, almost 34% indicated that they use this function only occasionally. These results suggest that most educators prefer to use their cell phones for this purpose. The reason for this could be that SMSs are more convenient and cheaper than buying birthday cards.

		Count	Col %
How often do you use your cell phone to send birthday wishes?	regularly	92	46.0%
	sometimes	67	33.5%
	rarely	32	16.0%
	never	6	3.0%
	spoilt response	1	.5%
	no response	2	1.0%
Total		200	100.0%

Figure 58: A table showing frequency at which educators use cell phone to send birthday wishes

4.8.6.3 Using cell phone to send Christmas wishes

		Count	Col %
How often do you use your cell phone to send Christmas messages	regularly	75	37.5%
	sometimes	64	32.0%
	rarely	30	15.0%
	never	26	13.0%
	no response	5	2.5%
Total		200	100.0%

Figure 59: A table showing frequency at which educators use cell phone to send Xmas messages

According to the results in figure 59 the majority of almost 38% respondents use cell phones to send Christmas messages. When this group is combined with those who sometimes use this function (32%) they constitute a large majority of 70% educators who use cell phones to send Xmas messages. This would suggest that more educators find using technology for communication more convenient than using cards. The more educators are exposed to technological means of communication the more their level of e-Readiness is elevated. Other cell phones have MMSs, which adds more fun because they allow users to attach pictures to messages they are sending.

4.8.7 Cross tabulation: Use of every day communication functions vs. use of personal convenience functions

Figure 60 below shows a Pearson's Significance Test indicating significance of correlations between the use of every-day communication functions and more advanced communication functions.

Correlations

		V2.1	V2.2	V2.3	V2.4
V1.1	Pearson Correlation	.253**	.252**	.000	-.099
	Sig. (2-tailed)	.000	.001	.997	.173
	N	189	185	192	190
V1.2	Pearson Correlation	.174*	.244**	.022	-.087
	Sig. (2-tailed)	.017	.001	.763	.233
	N	188	184	191	189
V1.3	Pearson Correlation	.027	.093	-.003	.030
	Sig. (2-tailed)	.717	.217	.966	.686
	N	182	177	185	183
V1.4	Pearson Correlation	.034	.067	.101	.156*
	Sig. (2-tailed)	.638	.368	.162	.031
	N	189	184	192	191
V1.5	Pearson Correlation	.055	.047	.107	.167*
	Sig. (2-tailed)	.449	.522	.136	.020
	N	192	187	195	193

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Figure 60: A table showing level of significance of correlations between the use of every-day communication functions and more advanced communication functions according to Pearson Significance Test

The variables in the first column represent every-day functions e.g.:

V1.1: - Make and receive phone calls

V1.2: - Send SMS to other individuals

V1.3: - Receive SMS from other individuals

V1.4: - Send SMS to groups

V1.5: - Chat with other individuals

The variables in the next columns represent more advanced communication functions e.g.

V2.1: - Send and receive e-mail

V2.2: - Send videos

V2.3: - Send birthday wishes

V2.4: - Send Christmas wishes

The interpretation rule for significance correlation of factors is that if the significance value is lower than or equal to 0.05, then there are statistically significant correlations between those study factors.

The correlated factors V1.1 and V2.1 have a significance value of 0.000, (underlined in red in figure 60) which is less than 0.05 and this indicates that there is statistically significant correlation between making and receiving calls and sending and receiving e-mail messages. This would suggest that there is a similarity between these functions as they serve the same purpose although using e-mail is more expensive than making a call. Also these functions are most frequently used by educators as indicated in sections (4.8.4.1) and (4.8.6.1).

A significant correlation is also evident between variables V1.1 and V2.2. These variables have a significance value of 0.001, which indicates that there is significant correlation between making and receiving calls and sending videos. This would suggest that people who use cell phones to make and receive calls are also likely to send videos, although the latter would require the user to have a more advanced cell phone.

There is also significant correlation between V1.2 and V2.1 and V2.2. They have significance values of 0.017 and 0.001 respectively, which is a relationship between sending SMS messages and sending videos and birthday wishes. This would suggest that people who use cell phones to send SMS messages are likely to send birthday wishes using the same function or MMS to send videos, although the latter would require a more advanced cell phone.

The V1.4 and V2.4 have a significance value of 0.031, which indicates a significant correlation between sending SMS messages to groups and sending Christmas messages. Cell phone users are likely to send Christmas messages to a number of people and using SMS function to send such messages to multiple recipients would be most convenient.

The V1.5 and V2.4 have significance value of 0.020 and this is an indication that there is statistically significant correlation between chatting with other individual and sending Christmas messages. This would suggest

that users are likely to convey Christmas messages while chatting with other individuals.

The question is, what do the above-mentioned correlations signify with regard to technology adoption? If one makes a general interpretation of the trends outlined above, it can be concluded that a significant proportion of the cell phone survey respondents do not merely use basic cell phone functions, but have become sophisticated users of this technology, and that this trend can be extrapolated to the same segment in the population at large. One can therefore conclude that a significant segment of teachers have become mature cell phone users that utilize more sophisticated cell phone functions for communicating about special occasions like birthdays.

If one contrasts the above-mentioned sophisticated use of cell phones with the target sample of educators' limited use of personal computers (see section 4.6), then one could wonder whether educators would not be inclined to leapfrog personal computers – as "old technology" in favour of using mobile learning (m-learning) technology and content?

4.8.8 Summary on cell phone use for more advanced communications

The pattern emerging from the responses to most questions in this section indicates that the majority educators use their cell phones to access more advanced communication facilities This trend could be attributed to the fact that sending cell phone messages is cheaper and more convenient Also, newer cell phones have been upgraded and include the Multi Media Message Service, (MMS) which adds more fun to sending messages. It is encouraging to note that educators are getting used to new and advanced technology and this enhances their level of e-Readiness. The Pearson's Significance Test conducted in this survey indicates significant correlations between cell phone use for every-day functions and use for more advanced function, depending on the type of cell phone the user owns. This is an indication that educators' use of cell phones is no longer limited to basic communication functions. Educators are now using more sophisticated cell

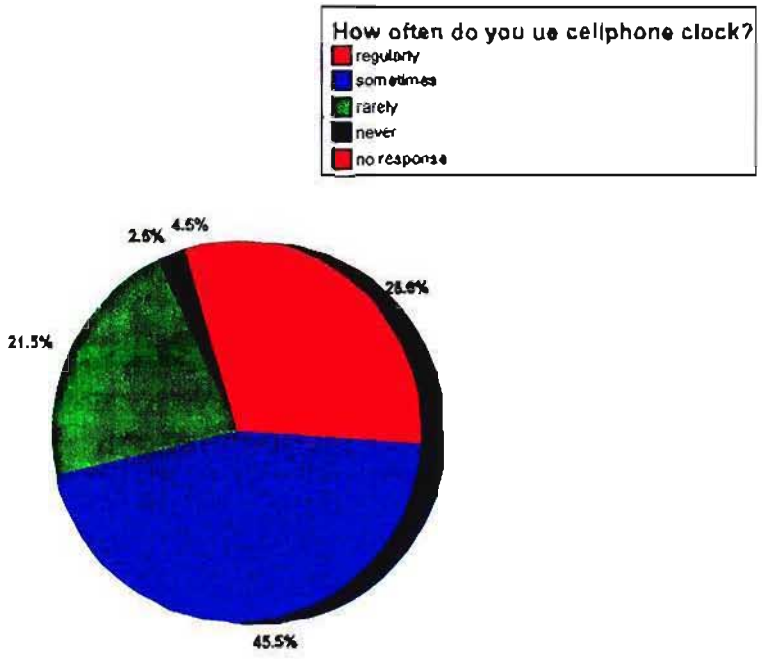


Figure 62: A pie graph showing frequency at which educators use cell phone to find time of the day

These results reveal a similar pattern with those of the previous question (4.8.8.1), in that they both suggest that cell phones have replaced the use of clocks and watches. However it is impossible to ignore the sizeable group of almost 22% who indicated that they seldom use their cell phones for this purpose, as this would suggest that they find it more convenient to use wristwatches instead of always reaching for their bags or pockets each time they want to check time of the day. Also, some people use wristwatches as fashion accessories. Such people would therefore not use cell phone watches.

4.8.9.3 Using cell phone to make calculations

According to figure 63, most educators are using cell phones to make calculations, considering that almost 30% said they use it regularly and almost 51% who use it occasionally. Both these groups make a total of 81%. Those who rarely use cell phone calculator combined with those who never use it constitute almost 18%. This would suggest that educators find it more convenient to use cell phone calculators, as most of them own cell phones. This again is an indication that educators are becoming more exposed to advanced technology.

		Count	Col %
How often do you use your cell phone's calculator?	regularly	59	29.5%
	sometimes	101	50.5%
	rarely	32	16.0%
	never	3	1.5%
	spoilt response	1	.5%
	no response	4	2.0%
Total		200	100.0%

Figure 63: A table showing frequency at which educators use cell phone's calculator

4.8.9.4 Using cell phone calendar

Figure 64 below shows that the majority of educators use cell phone calendar. Almost 22%educators said they use cell phone calendar regularly and 47% occasionally. These two groups combined make a total of 69%.

		Count	Col %
How often do you use your cell phone's calendar?	regularly	43	21.5%
	sometimes	94	47.0%
	rarely	39	19.5%
	never	18	9.0%
	no response	6	3.0%
Total		200	100.0%

Figure 64: A table showing frequency at which educators use cell phone calendar

These results however reveal that using the cell phone calendar is not as popular as other convenience functions discussed in this section, considering that almost 20% said they rarely use this function. If one adds the 19% who said they never use cell phone calendar to this group, they make a total of 39%, which is a sizeable number of educators who do not use this function. Nevertheless, the results suggest that educators find cell phone calendar more convenient since they carry their cell phones all the time and therefore this allows them to check the date anytime the need arises.

4.8.10 Summary on cell phone use for personal convenience

The pattern that emerges from responses to questions in this section suggests that most educators, although not necessarily the majority, have adopted the use of cell phones for personal convenience. Responses that indicate that educators sometimes use functions for personal convenience range from 30% to 35% and those that indicate regular use range from 40% to 45%.

Those who rarely use these functions, although they are a minority, cannot be ignored, as they constitute a sizeable number. This factor would suggest that although educators seem to have adopted technological innovations, a sizeable number of educators are somehow still relying on older technologies such as clocks and calendars for a variety of reasons, some of them already mentioned in this section. However it is encouraging to note

that educators are using cell phones as this exposes them to affordable electronic communication technology and therefore increases their level of e-Readiness.

4.8.11 Using cell phone for entertainment/business purposes

Cell phones provide functions that allow the user to conduct business activities and also entertainment. This survey aims to determine the extent at which educators utilize these functions as an indication of e-Readiness.

4.8.11.1 Using cell phone to access Internet for fun

Figure 65 below indicates that a small majority of educators who polled 49% never use their cell phones to access the Internet for fun. However a sizeable number of respondents, almost 27%, rarely use this function.

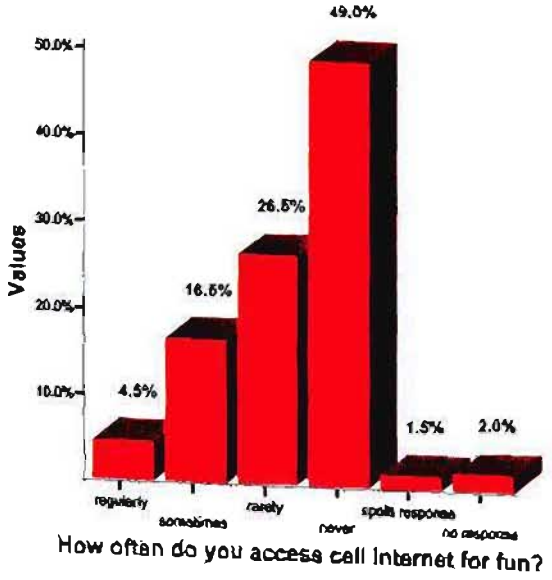


Figure 65: A bar graph illustrating frequency at which educators use cell phone to access Internet for fun

This could be attributed to Internet is costly and the fact that it can only be accessed using advanced cell phones. Basic and intermediate cell phones do not allow Internet access. Another possibility could be that some users do not know how to connect to the Internet. The advantage of cell phone Internet is that it allows educators who do not have computers to access information. The Internet is essential to the technological transformation proposed by the S.A. Department of Education and its significance to educators' e-Readiness cannot be emphasized enough. Therefore the educators' limited access to the Internet deprives them valuable source of information and that impacts on their level of e-Readiness.

4.8.11.2 Using cell phone to access Internet for online shopping

According to the results shown in figure 66, 52% indicated that they never use this facility and only 12% said they sometimes use it. A further 27% indicated that they rarely use it. There is a similarity between these results and those from the previous question (figure 65). Both show that the majority of respondents do not use the Internet to access these functions. The underlying factors could be the same as those stated earlier regarding Internet costs. Another possibility could be that most people prefer buying from shops as it allows them the advantage of touching and feeling the quality of what they are buying instead of relying on the information supplied through the Internet.

		Count	Col %
How often do you use your cell phone to access the Internet for online shopping?	regularly	12	6.0%
	sometimes	25	12.5%
	rarely	54	27.0%
	never	104	52.0%
	spoilt response	1	.5%
	no response	4	2.0%
Total		200	100.0%

Figure 66: A table showing the frequency at which educators use the Internet for online shopping

4.8.11.3 Using cell phone for mobile banking

		Count	Col %
How often do you use your cell phone for mobile banking?	regularly	15	7.5%
	sometimes	25	12.5%
	rarely	51	25.5%
	never	102	51.0%
	spoilt response	2	1.0%
	no response	5	2.5%
Total		200	100.0%

Figure 67: A table showing frequency at which educators use cell phone for mobile banking

Figure 67 on the left indicates that close to 8% respondents use cell phone banking only occasionally. Those who never use this function polled 51%, and when they are combined with those educators who rarely use cell phone for banking, they constitute a total of almost 77%. This would suggest that the majority of educators do not use this function. This could be attributed to the fact that it costs more than other facilities available on the cell phone. Also, the user needs to have an advanced cell phone to access the Internet. These results are almost similar to those in figure 66 above as they both show that respondents do not use Internet cell phone. The value of Inter-

net as a useful source of information has been mentioned elsewhere in this section and it is unfortunate that educators hardly use it.

4.8.11.4 Using cell phone for playing and downloading games

		Count	Col %
How often do you use your cell phone to donload/ play games?	regularly	52	26.0%
	sometimes	76	38.0%
	rarely	46	23.0%
	never	24	12.0%
	no response	2	1.0%
Total		200	100.0%

Figure 68: A table showing frequency at which educators use cell phones for playing and downloading games

The results illustrated in figure 68 on the left show that the majority of respondents use their cell phones to download or play videos. This is indicated by a combination of educators who said they use this function regularly (26%) and those who use it only occasionally (38%). These make a total of 64%. The respondents who rarely use this function and those who never use it also constitute a sizeable number (a total of 35%). This could be an indication that this function is not popular among educators. However educators could encourage learners to play educational games that stimulate their creative thinking abilities. This type of learning is known as *edutainment.*

4.8.11.5 Using cell phone to take photos

The results in figure 69 below shows that 41.0% of respondents said they sometimes use this facility for taking photos and almost 33% use it on regular basis. Those who said they rarely use it polled almost 17% and 9.0% said they never use this function. These figures suggest that most educators use this function. Taking photos is fun and pictures are useful in enhancing understanding of learning material especially for lower grades and learners could be encouraged to use this function if their cell phones allows it. However, most learners own basic cell phones that do not have this facility and

therefore educators can use their own cell phones to take pictures that could be used for educational purposes.

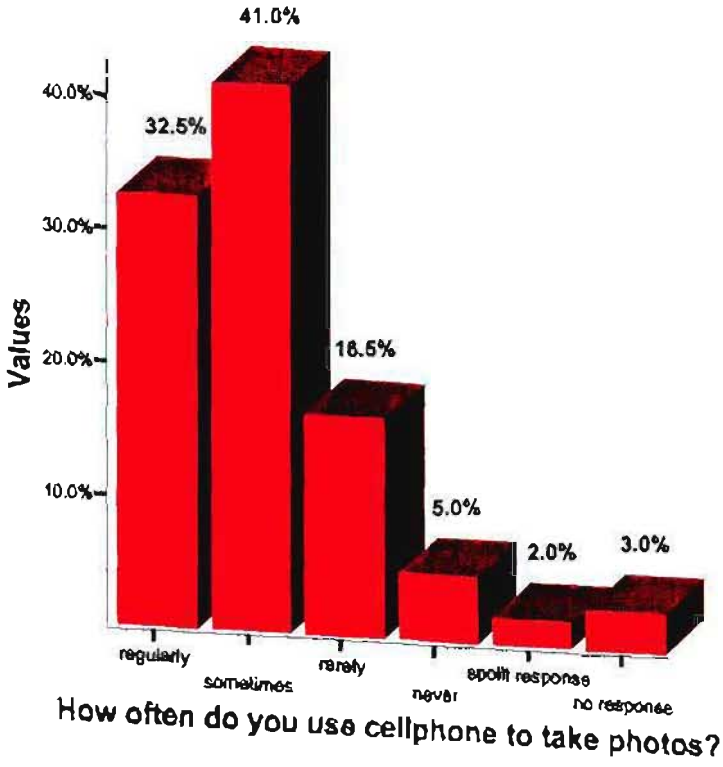


Figure 69: A bar graph illustrating frequency at which educators use cell phone to take photos

4.8.11.6 Using cell phone to make videos

The results in figure 70 below illustrate that 38% respondents indicated that they sometimes use this facility and almost 30% use this facility on regular basis. These figures could be an indication that most educators use cell phones to make videos. This could be attributed to the fact that making videos is fun and it is a free service. Educators could encourage learners to use this function for educational purposes by allowing them to take videos of their school projects. Videos are also useful for presentation

of learning material and projects and therefore allow educators to integrate electronic technology to teaching and learning activities.

		Count	Col %
How often do you use your cell phone to make videos?	regularly	59	29.5%
	sometimes	76	38.0%
	rarely	37	18.5%
	never	15	7.5%
	spoilt response	4	2.0%
	no response	9	4.5%
Total		200	100.0%

Figure 70: A table showing frequency at which educators use cell phones to make videos

4.8.11.7 Using cell phone to listen to the radio

		Count	Col %
How often do you use your cell phone to listen to the radio?	regularly	45	22.5%
	sometimes	76	38.0%
	rarely	50	25.0%
	never	14	7.0%
	spoilt response	7	3.5%
	no response	8	4.0%
Total		200	100.0%

Figure 71: A table showing frequency at which educators use cell phones to listen to the radio

According to figure 71 on the left, most educators use cell phones to listen to the radio. Almost 23% said they use this function on regular basis and 38% use it occasionally. If these two groups are combined they make a total of 60%. However the results show that listening to cell phone radio is not very popular considering that almost 25% said they rarely use it and 7.0% never use it. Together these make a sizeable total of 32%. Nevertheless these results suggest that educators find it convenient to listen to

cell phone radio since the cell phone allows the user to access this function anytime and anywhere the need arises.

4.8.11.8 Using cell phone to receive notices /adverts from shops

		Count	Col %
How often do you use your cell phone to receive adverts from shops?	regularly	16	8.0%
	sometimes	40	20.0%
	rarely	36	18.0%
	never	98	49.0%
	spoilt response	3	1.5%
	no response	7	3.5%
Total		200	100.0%

Figure 72: A table showing frequency at which educators use cell phone to receive adverts/ notices from shops

According to the results shown in figure 72 on the left, most the respondents do not use this facility. The majority of 49% said they never use this function and if this group is combined with those who said they rarely use this facility (18%), they make a total of 67%. Only 20% said they sometimes use this function and only 8.0% said they use it on regular basis. This is surprising because shops send messages through SMS and receiving these SMS is free, users do not have to pay for such service. The 20% therefore could be representative of those educators who actually read shop notices if they are sent to them.

4.8.12 Statistical significant difference of opinions between different age groups regarding the use of cell phone for entertainment purposes

Figure 73 below shows level of significance difference between opinions of different age groups regarding the use of cell phone for business and entertainment convenience purposes, according to the ANOVA Test.

ANOVA

		Sum of Squares	df	Mean Square	Sig.
V4.1	Between Groups	.282	2	.141	.854
	Within Groups	111.210	125	.890	
	Total	111.492	127		
V4.2	Between Groups	.715	2	.358	.665
	Within Groups	110.277	126	.875	
	Total	110.992	128		
V4.3	Between Groups	.085	2	.042	.958
	Within Groups	125.125	126	.993	
	Total	125.209	128		
V4.4	Between Groups	2.267	2	1.134	.324
	Within Groups	129.507	130	.996	
	Total	131.774	132		
V4.5	Between Groups	.694	2	.347	.698
	Within Groups	118.512	123	.964	
	Total	119.206	125		
V4.6	Between Groups	1.731	2	.865	.397
	Within Groups	116.144	125	.929	
	Total	117.875	127		
V4.7	Between Groups	3.182	2	1.591	.140
	Within Groups	98.866	124	.797	
	Total	102.047	126		

Figure 73: A table showing significant difference of opinions of different age groups regarding the use of cell phones for business/ entertainment purposes according to ANOVA test

The figures in the first column represent variables for business and entertainment functions as follows:

V4.1: - Access Internet for fun

V4.2: - Access Internet for online shopping

V4.3: - Access Internet for mobile banking

V4.4: - Play/ Download games

V4.5: - Download games

V4.6: - Download music/videos via Blue tooth

V4.7: - Take photos

The interpretation rule for the ANOVA Test is that if the significance value is less than or equal to **0.05,** then there is statistically significant difference between the groups' opinions regarding study factors. Also, if the significance value is greater than 0.05, then there is no significant difference between groups' opinions. The significance value is indicated in the last column.

The table shows that V4.1, V4.2, V4.3, V4.4. V4.5, V4.6 and V4.7 have significance values of 0.854, 0.665, 0.958, 0.324, 0.698, 0.397 and 0.140 respectively, (underlined in red in figure 73). All these values are greater than 0.05 and therefore indicate that there is no significant difference of opinions within different age groups regarding the use of cell phone for most entertainment and business convenience functions mentioned above. This would suggest that the majority of educators use cell phones for business and entertainment purposes irrespective of their age groups. This is also indicated by the responses to almost all questions in subsection 4.8.10, which deal with the use of cell phone for business or entertainment purposes.

Figure 74 below shows significant difference of opinions between age groups regarding the use of cell phone for business and entertainment purposes, according to the ANOVA Test.

ANOVA

		Sum of Squares	df	Mean Square	Sig.
V4.8	Between Groups	3.837	2	1.918	.116
	Within Groups	112.133	128	.876	
	Total	115.969	130		
V4.9	Between Groups	1.210	2	.605	.541
	Within Groups	120.663	123	.981	
	Total	121.873	125		
V4.10	Between Groups	.289	2	.145	.839
	Within Groups	99.646	121	.824	
	Total	99.935	123		
V4.11	Between Groups	2.706	2	1.353	.236
	Within Groups	116.596	126	.925	
	Total	119.302	128		
V4.12	Between Groups	8.236	2	4.118	.021
	Within Groups	125.401	121	1.036	
	Total	133.637	123		
V4.13	Between Groups	.983	2	.491	.661
	Within Groups	147.822	125	1.183	
	Total	148.805	127		
V4.14	Between Groups	.145	2	.072	.901
	Within Groups	89.575	129	.694	
	Total	89.720	131		

Figure 74: A table showing significant difference of opinions of different age groups regarding the use of cell phone for business/ entertainment purposes according to ANOVA test

The variables regarding entertainment or business functions are represented in the first column as follows:

V4.8: - Send photos

V4.9: - Make videos

V4.10: - Listen to radio

V4.11: - Voice recording

V4.12: - Pass on humorous messages

V4.13: - Receive notices/ adverts from shops

V4.14: - GPS tracking

The V4.8, V4.9, 4.10, V4.11, V.13 and V4.14 have significance values of 0.116, 0.541, 0.839, 0.236, 0.661 and 0.901 respectively. All these values are greater than 0.05 and therefore indicate that there is no significant differ-

ence between opinions of different age groups regarding the use of cell phone for business and entertainment purposes.

However, V4.12 has a significance value of 0.021, which is lower than 0.05, and it indicates that there is significant difference of opinion between different age groups regarding the use of cell phone to pass on humorous messages. This could suggest this function would be more popular among younger educators. Matured adults and senior educators are unlikely to have time for this kind of entertainment and would not find it useful for business either. On the other hand, young adults would find it enjoyable and entertaining.

These results therefore suggest that almost all educators in rural schools, irrespective of their age, perceive these functions as useful and would definitely use them for business and entertainment purposes, with the exception of V.12, which represents using cell phone for passing humorous messages. Some segment of educators, most probably matured and senior educators do not find this useful for business and entertainment.

4.8.13 Summary on the use of cell phone for entertainment and business functions

The responses to questions from this subsection indicate that most educators use cell phones for entertainment. Educators could encourage learners to use such facilities as learning aids since learning becomes more effective when it involves entertainment. This form of learning is called *edutainment.* The results however reveal opposite trends regarding cell phone use for business functions. They show that a very small percentage of educators use cell phone for online shopping and online banking. The reason for this could be that business functions involve connecting to the Internet, which is more costly compared to other cell phone functions.

Responses to questions about using Internet for online shopping and mobile banking therefore reveal that a large percentage of educators shy away from using these facilities. This is unfortunate because educators should be ready to be part of the digital age and the ability to conduct e-Business is an indication of e-Readiness. However, it is encouraging to note that the results from the ANOVA test conducted on the use of these functions show that almost all educators, irrespective of their age regard these functions as useful for business and entertainment.

4.8.14 Learners' use of cell phone during lessons

Figure 75 below shows how educators responded to the question on whether the use of cell phones during lessons is disruptive. A large majority of 68% said they think it is disruptive while almost 18% indicated that it is not. This could mean that although educators recognize the need for learners to own cell phones, they also feel its use should be controlled as not to disturb teaching and learning. It is noted however that almost 12% of educators chose not to respond to this question, which could mean that some educators have not yet been able to determine the effect cell phone use during lessons.

		Count	Col %
Do you think learners use of cell phones in disruptive ways during lessons?	yes	136	68.0%
	no	35	17.5%
	unsure	6	3.0%
	no response	23	11.5%
Total		200	100.0%

Figure 75: A table showing educators' perceptions on the use of cell phones during lessons

4.8.15 Learners' taking cell phones to school

According to the results shown in figure 76 below, the majority of educators feel that carrying of cell phones threatens the safety of learners as it invites muggings. These results reflect concerns similar to those indicated in figure 75 above whereby educators seem to be concerned about cell phones as a distracting factor in the classroom. This is an indication that educators would prefer learners not to carry cell phones during school hours.

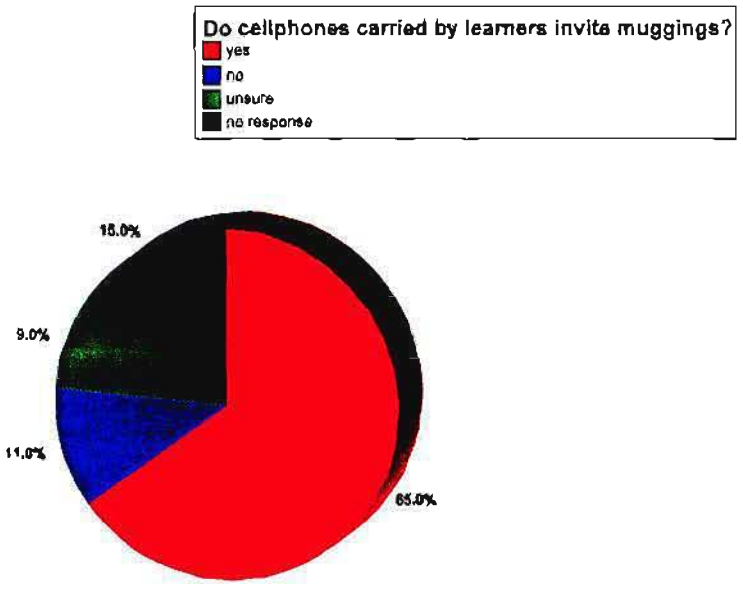


Figure 76: A pie graph showing educators concern about the safety of learners carrying cell phones

4.9 CONCLUSION

In this chapter the researcher presented the interpretation of data. The aim was to establish the level at which educators have adopted basic and advanced electronic communication technologies and also their attitude towards using these to deliver e-Education in rural schools, as this would determine their level of e-Readiness. At the initial stage of this chapter the researcher presented demographic profile of respondents. The subsequent sections provided information about educators' use of ICTs, educators' skills and training, e-Learning facilities available in rural schools and educators' perceptions and attitudes towards the use ICT for e-Education.

A follow-up survey of educators' adoption of cell phones as an indication of e-Readiness was conducted in this chapter. The results of this survey are included in this chapter and form part of the overall research.

In the next chapter the researcher will draw conclusions about the perceptions of educators in rural schools regarding the use of ICT for e-Education and also their level of e-Readiness. She will also make recommendations that could be useful in the implementation of policy on e-Education proposed by the KwaZulu-Natal Department of Education.

Chapter 5

ANSWERS TO RESEARCH QUESTIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this chapter the researcher will present an overview of the research on the attitudes and perceptions of educators in rural public schools of KwaZulu-Natal regarding the use of ICT to deliver e-Education to rural schools. Further, the researcher will provide answers to critical questions that prompted this study and are stated in the first chapter. These answers are based on the theoretical framework of this study and demonstrate whether the researcher has managed to address the critical questions that prompted this study.

The researcher will also point out critical questions that could not be addressed by the study and state limitations that contributed to this shortcoming. Finally, recommendations will be made for the way forward.

5.2 BRIEF OVERVIEW OF THE STUDY

5.2.1 Research problem

In an attempt to integrate findings and recommendations emanating from this study, it is necessary to summarize and review the research process in order to determine whether the objectives of the study were achieved. This study was prompted by the South African White Paper on e-Education (2004) whereby the South African Department of Education states its intention to introduce ICT for e-Education by 2013.

Against this backdrop, the researcher conducted a quantitative research to investigate the attitudes and perceptions of educators towards the

use of ICT to deliver e-Education. The study mainly focused on educators in rural schools and it aimed to establish whether these educators are ready for and receptive of this initiative. This is referred to as e-Readiness. E-Readiness therefore forms the basis of the theoretical framework of this study.

5.2.2 Literature Survey

The study entailed literature survey to determine which aspects of the research problem have been researched elsewhere and how applicable the solutions of such research are for e-Education in South Africa. The literature survey further involved the use of electronic reference sources of UKZN namely NEXUS, SABINET EBSCO-HOST etc.

5.2.3 Empirical Research

The literature survey was followed by an empirical investigation using quantitative approach. This involved a structured questionnaire-based survey of a sample of educators from rural school of Umbumbulu District in KwaZulu-Natal. Data was obtained from KZN Education Management Information (EMIS) unit. The researcher used this information to ensure that the research targeted a representative sample. The researcher also obtained permission from KZN Department of Education to conduct the survey at the targeted schools. The research supervisor was requested to write the request letter on behalf of the researcher

5.2.4 Data Analysis

The researcher used the statistical program SPSS 13 to analyse data and to determine correlations between variables. SPSS was also used to compile tables and graphs.

5.3 LIMITATIONS

The researcher wishes to point out a number of limitations to the validity of this study.

5.3.1 Self-report survey

The study involved a self-report survey whereby the researcher based her findings only on responses from structured questionnaires. The survey does not include back-up tests to determine whether respondents are using or are able to use programs investigated in the research. Therefore this study is unable to prove the validity of responses regarding this factor.

5.3.2 Inconsistency in some responses

The results revealed some inconsistencies in responses to questions relating to educators' access to advanced electronic communication technologies, (4.5). The educators stated in their responses that they have computers at home and therefore have access to advanced technologies. However responses to subsequent questions revealed that educators are not using most of the programs that are investigated because they do not have computers. This hinders attempts to establish valuable information and therefore compromises the validity of this study.

5.3.3 Follow-up cell phone survey

The initial survey involved a sample of 400 educators from rural schools of Umbumbulu District in KwaZulu Natal. In the follow-up survey the researcher used a sample of 200 educators from the same area but different schools. Therefore this study involved completely different respondents and the researcher could not therefore draw comparisons between computer adoption and cell phone adoption as indication of e-Readiness among educators of rural public schools of KwaZulu-Natal. These had to be dealt with separately.

5.4 ANSWERS TO CRITICAL QUESTIONS

In this section the researcher presents answers to critical questions that prompted this study.

5.4.1 What are the attitudes of educators in the rural schools of Kwa-Zulu-Natal towards using ICT for e-Education?

The proposal by the South African Department of Education to introduce e-Education to public schools is going to bring about reforms in education. According to McConnell Institute (2001) technology acceptance is one of the main rankings that are used to assess e-Readiness. It is therefore essential that educators accept imminent changes in education and are willing to adopt the new policy as this would lead to its successful implementation. Educators are in the forefront of e-Education delivery because they carry major responsibilities for what happens in the classroom. Their ability to develop positive attitude towards technology is an indication of e-Readiness.

Results from the survey reveal that educators in rural school of KwaZulu-Natal are positive about introduction of e-Education and would be willing to implement the policy in the classroom. The limiting factors however, would be their lack of exposure to electronic technologies and also lack of necessary resources, a situation that is prevalent in almost all rural schools in the province.

5.4.2 Are educators in rural public schools ready to use ICT for e-Education?

According to the South African White Paper on e-Education (2004) the provision of computers is an integral part of the implementation of e-Education. It states that the Department of Education will establish a desired level of technology resources (hardware and software) for each GET and FET institution at provincial level and assess the adequacy of existing equipment and facilities. It will also develop norms and standards for new and refurbished computers.

This study revealed that educators in rural public schools of Kwa-Zulu-Natal are not exposed to advanced electronic communication technologies like computers, and therefore lack the necessary skills to integrate

technology into teaching and learning activities in the classroom. Results revealed inconsistency in educators' responses whereby the majority stated that they have computers at home; however subsequent responses revealed that they are not using most of the computer programs because of lack of access to computers. Therefore this suggests that educators lack the necessary skills to integrate technology into their teaching and learning activities as envisaged by the e-Education policy. Educators also have no access to computers at their workplace because most rural schools are poorly equipped.

Although the initial survey indicated that educators have limited use of personal computers, the follow-up survey showed that a significant segment of educators in rural schools use more advanced cell phone functions for everyday communication, personal convenience, business and entertainment purposes. This raises a possibility of educators leapfrogging the use of personal computers in favour of mobile devices for educational purposes, *(m-Learning)*. According to Van Wyk (2007), the national director for ICT in the Department of Education, the Department is planning to introduce this type of learning and such a development would immensely benefit rural schools where computers are not available.

5.4.3 How do educators in rural schools perceive ICT for e-Education to other modes of education delivery?

According to this study educators in rural schools believe that the technological innovations proposed by the Department of Education are going to have a positive impact on education delivery and it is going to improve their reach in the classroom. Despite lack of necessary resources at their schools, educators indicated that they would welcome reforms proposed for education delivery. Also, the fact that the majority educators have taken the initiative to undergo some training in computer literacy is an indication that they do not suffer technophobia and do not feel that technology threatens their role in the classroom. The problem is the lack of facilities at

their schools, a factor that has deprived educators the opportunity to utilize these skills in the classroom.

5.4.4 Do educators in rural schools possess adequate qualifications and skills to enable them to do effective teaching in an e-Education setting?

This study reveals that although some educators have acquired some computer skills at different levels, they have not been able to make use of these skills because of lack of facilities to enable them to use such skills to improve their performance in the classroom. These educators therefore would not be in a position to do effective teaching in an e-Education setting unless they undergo training or retraining to refresh computer skills.

5.4.5 Are rural schools adequately equipped to implement e-Education?

The findings of the study indicate that there is lack of necessary technological infrastructure and resources to enable rural schools to implement e-Education. The study revealed that very few rural schools have computers and those with computers connected to the Internet are even fewer. This is an unfortunate situation since computers are integral to the South African Department of Education strategy for e-Education.

Because of this lack of computers, very few educators are using computer software to enhance their performance in class. Learners are also not able to access information for school assignments and projects. Therefore learners are also deprived the most valuable e-Learning facilities that could improve quality of education they receive at school.

5.4.6 Could different perceptions expressed about e-Education by educators in rural public schools of KwaZulu-Natal be related to demographic differences such as gender, age etc?

Due to the inconsistencies discovered in the data regarding educators' use of advanced electronic communications (4.5), which are also men-

tioned in this chapter (5.3), the researcher decided against running significance tables and therefore has been unable to establish educators' difference of opinions and perceptions among educators based on age and gender.

However, during the follow-up survey regarding educators' use of cell phones, the researcher found no inconsistencies and subsequently ran significance tests which revealed that there is no significant difference of opinions among educators based on age and gender towards the use of cell phones for different purposes. The survey revealed that educators have similar perceptions towards cell phone use for almost all purposes except only a few that relate to entertainment functions that are not popular among matured and senior educators. The survey also revealed that by using cell phones, a significant segment of educators have been exposed to more sophisticated communication technology.

5.4.7 What training or retraining do educators in rural schools require?

According to the findings of this study, the majority of educators in rural schools have received training in computer literacy, privately at their own initiative, ranging from basic to intermediate levels. This is an indication that educators are aware of the changes that are taking place in education and have taken the initiative to equip themselves with necessary skills compatible with demands of such developments.

However, despite these efforts, educators have not been able to utilize their computer skills because of lack of technological resources in rural schools. This would then suggest a possibility that their skills have become rusty and would therefore require retraining to brush up their computer skills. Those educators who have not received any training constitute a sizeable percentage and cannot be ignored. They need to receive training in computer literacy that would allow them to use advanced communication

technologies with confidence when these are provided at their schools as part of the DoE's e-Education rollout strategy.

5.5 RECOMMENDATIONS

The educators' perceptions and attitudes towards the use of ICT to deliver e-Education determine their abilities and willingness to embrace and implement this policy in the classroom. These in turn determine their level of e-Readiness. The findings of this study revealed low level of e-Readiness for educators in rural schools of KwaZulu-Natal. Against this backdrop, this researcher makes recommendations that she believes would improve the level of e-Readiness of educators in the rural schools and prepare them for the e-Education rollout strategy.

- According to the findings of this study, educators in many rural schools of KwaZulu-Natal have a positive attitude towards the use of ICT to deliver e-Education. However they lack the necessary qualifications and skills to implement this policy in the classroom. Educators are in the forefront of the implantation of e–Education policy in the classroom and therefore the Department of Education should provide educators in rural schools with the necessary training to enable them to implement the policy in the classroom. Although a significant segment of educators have managed to obtain training in computer literacy privately at their own initiative, at basic and intermediate levels, they have not been able to utilize these skills in the classroom because of lack of resources prevalent in rural schools. These educators will require retraining in order to improve their computer skills. The Department of Education should provide refresher courses in computer literacy for these educators to improve their reach in the classroom. Also, Computer Studies should form part of the curriculum for student educators still in universities and colleges to equip them with skills to utilize when they begin their careers in education.

- The educators' attitudes and perceptions towards the use of ICT in education are closely related to how much educators are exposed to technology. This brings the issue of technology availability and accessibility to the fore. Lack of necessary technology and telecommunications infrastructure in the rural areas is reflected in schools that are poorly equipped. These schools provide for poor rural communities who cannot afford to purchase such facilities for their schools. The Department of Education should provide rural schools with necessary technological resources and ensure that schools are connected to the Internet.

- Van Wyk (2007), states that the e-Education implementation strategy at provincial level has had problems getting off the ground because of various challenges including funding. This is an indication that this is a mammoth task for the Department of Education to undertake on its own without assistance from the private sector. Therefore there need to be a Public-Private Partnership whereby the government collaborates with and encourages private companies to get involved in the provision of technology infrastructure and connectivity. There should also be collaboration between the Department of Education and Department of Communications whereby the latter will provide affordable connectivity through the Universal Access Fund announced by Matsepe-Cassaburi, the South African Minister of Communications in 2006, to address technology accessibility.

- According to the findings of this study, educators in rural schools are using cell phones for variety of functions; from day to day communication to more advanced functions like conducting business matters through cell phone online connection. This indicates a possibility of educators leapfrogging from using personal com-

puters to sophisticated mobile technology. The Department of Education should consider adopting use of mobile devices like cell phones, PDAs and iPods in education (*m-Learning*). Its advantage is that it uses wireless devices and therefore allows learning to take place anywhere and anytime. It does not restrict the learner to the classroom or library and the educator to the staffroom or classroom. Another advantage is that cell phones are popular among the youth. According to Motiwalla (2007) SMS messaging is popular among the youth which makes it ideal for this type of learning whereby educators could send learners information about assignments and projects to be done and also remind them about due dates etc.

5.6 CONCLUSION

The introduction of e-Education to public schools in South Africa is an exciting development that is going to elevate the standard of education to compete with that of developed countries. It will also assist learners to develop critical thinking, comprehension, reading and writing skills. However, the focus is on educators as they have a pivotal role to play in the implementation of the policy in the classroom. This study shows that educators lack the necessary skills required for this purpose. Those who have managed to acquire computers skills have not been able to utilize them because of lack of technological resources at their schools. This reflects a low level of e-Readiness on the part of educators. It is imperative that educators undergo training and retraining to enable them to use technology with confidence.

Presently, schools in previously disadvantaged communities are poorly equipped, a legacy of the previous dispensation. Rural schools are even more affected. It is crucial that the South African Department of Education provide schools with necessary infrastructure and resources for the e-Education strategy to be successful. However, this is mammoth task

for the DoE to shoulder alone. This necessitates collaboration between the government, the private sector and non-governmental organizations.

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ADDENDA

ADDENDUM 1: ETHICAL CLEARANCE DOCUMENTS

RESEARCH OFFICE (GOVAN MBEKI CENTRE)
WESTVILLE CAMPUS
TELEPHONE NO.: 031 - 2603587
EMAIL : ximbap@ukzn.ac.za

UNIVERSITY OF
KWAZULU-NATAL

11 DECEMBER 2006

MS. YN MATSEMELA (204002112)
INFORMATION SYSTEMS AND TECHNOLOGY

Dear Ms. Matsemela

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/06855A

I wish to confirm that ethical clearance has been granted for the following project:

"The attitudes and perceptions of educators in the rural schools of KZN towards the sue of ICT to deliver e-Education in rural communities"

Yours faithfully

MS. PHUMELELE XIMBA
RESEARCH OFFICE

cc. Faculty Office (Cheralyn Terblanche)
cc. Prof. R Klopper
cc. Prof. S Lubbe

ADDENDUM 2: CONCEPT MATRIX

Theme:

(Each cell below contains a white tick mark. To activate it, highlight the cell and use the "font colour" icon (top right) to colour it black: ✓).

Concepts / References	e-Learning	e-Rate	Digital Divide	e-Readiness	Odyssey Project	Technology acceptance	TAM	Digital Inclusiveness	Multipurpose Community Centres	ICT for Development	E-Schools	Smart phones	m-Learning	Gender Equity	Research Methodology			
Arnold *et al.*(2002)															✓			
Averweg (2005)						✓	✓											
Baylor *et al.* (2002)																		
Boss (2002)					✓													
Bridges.Org (2005)			✓	✓														
Buthelezi *et al.* (2005)									✓									
California Dept of Ed		✓																
Chasa (2003)			✓															
Chen *et al.* (2008 sic)													✓					
Cradler (2003)	✓	✓																
Demetriadis *et al.* (2003)					✓													

Dumas (2004)												✓						
Dumas (2002)									✓									
Easton *et al.* (2000)			✓															
Federal Comm. Commission (2003)		✓																
Economist Intelligence Unit (2002)				✓														
Economist Intelligence Unit (2005)				✓														
GCIS (2001)									✓									
GCIS (2006)									✓									
Guermazi (2003)			✓					✓						✓				
Hall *et al.* (2004)												✓						
Harris (2002)	✓																	
Hargitttai (2002)			✓															
Hoffman *et al.* (1998)			✓															
Hu *et al.* (2003)							✓											
ITG (2000)				✓														
InfoDev (2002)								✓										
Jacobs &Herselman (2005)									✓									

Klopper (2005)	✓									✓								
Leedy & Ormrod (2005)																		✓
Lesoba Consult (2001)		✓																
Likkanen (2003)																		
Lubbe &Klopper (2004)																		✓
McConnell (2000)				✓														
McConnell (2001)				✓														
Mallison *et al.* (2005)	✓																	
Motiwalla (2007)													✓					
Mulama (2004)										✓								
Naidoo& Klopper (2005)				✓														
Nicholls(2003)	✓	✓																
NITF (1998)									✓									
Paul *et al.*(2000)										✓								
Proenza *et al.*(2001)									✓									
Ong *et al.* (2004)						✓	✓											
Oyedemi (2005)		✓							✓	✓								
Quaynor (2002)																		
Rampersad (2004)										✓								
Rau *et al.* (2008													✓					

sic)																		
Rugbeer (2003)																		
Shade (2002)																		
Sikhakhane *et al.* (2005)			✓															
Sunda (2003)					✓													
Tinio (2002)																		
Van Wyk (2007)														✓				
USAC (2002)		✓																
Vosloo (2005)			✓															
Warschauer(2003		✓	✓															
White Paper on e-Education (2004)	✓	✓	✓								✓	✓						

ADDENDUM 3: RESEARCH INSTRUMENT

For Office Use Only: Respondent Code: _____ School Code: _____

Confidential Survey of School Management Teams and Educators At Public Schools in KwaZulu-Natal

How often I use forms of electronic communication at home and at school

Researcher: Ms. YN. Matsemela
Study leader: Prof. RM Klopper
(Mobile: 0844466662, eMail: rklopper@ukzn.ac.za)
School of Information Systems & Technology
University of KwaZulu-Natal

Electronic communication instruments

1. Ordinary radios and TVs;
2. PCs and notebook computers on their own, or part of a network of computers;
3. Video machines, CD players, DVD players linked to a TV or a media projector;
4. Console games machines like the Xbox, the Nintendo Gamecube and the Sony PS2;
5. New devices like cell phones, Smart Phones, Pocket PCs and Personal Digital Assistants (PDAs).

Hardware: computers used on their own, or linked to form a network of computers via a master computer, known as a server.

Software: computer programs loaded into computers that allow one to write documents, to create drawings, make calculations, or play games.

To the educator

- We need your help to find out what roles electronic communication, and electronic learning play in your home and at your school.
- If you do not want to take part in this survey, just hand in the blank questionnaire at the end of the survey session.
- Your answers will remain confidential. No one will be able to trace your answers back to you as a person.
- The questionnaire has five parts:

  Part 1 asks general personal particulars like your age, gender and home language.

  Part 2 asks about the communication instruments that you use at home.

  Part 3 asks about which computer software programs you use at home.

  Part 4 asks about which computer software programs used at your school.

  Part 5 asks about electronic learning facilities at your school.

How to complete the questionnaire

1. Please answer the questions as truthfully as you can. Also, please be sure to read and follow the directions for each part.
2. We can only use your answers if you give us permission to do so.
3. We are only asking you about things that you and your colleagues should feel comfortable telling

us. However, if you don't feel comfortable answering a question, you can leave it blank. For those questions that you do answer, your responses will be kept confidential.

4. Please mark your answers with a PEN (not a pencil).
5. Tick only one option per question or fill in the required information.

Thank you very much for being willing to complete this questionnaire.

You have to give us permission to use your answers. Your personal particulars will remain confidential.

Name: _____ Signature: _____ Date: _____

PART 1: YOUR PERSONAL PARTICULARS

1. Your age: _____
2. Your gender: ❑ Female ❑ Male
3. Your ethnic group:

❑ African ❑ Coloured ❑ Indian ❑ White ❑ Another: _____

❑ I do not want to answer this question

4. The area where you live: ❑ rural area ❑ urban area
5. Your school: ❑ girls only school ❑ boys only school ❑ mixed school
6. Your rank:

❑ Principal ❑ Deputy Principal ❑ HOD ❑ Level 1 Educator

PART 2: HOW FREQUENTLY YOU USE THE FOLLOWING COMMUNICATION INSTRUMENTS AT HOME

7. An ordinary telephone:

❑ No telephone ❑ Daily ❑ Sometimes ❑ Never

8. The radio:

❑ No radio ❑ Daily ❑ Sometimes ❑ Never

9. The TV:

❑ No TV ❑ Daily ❑ Sometimes ❑ Never

10. Watching videos, using a VCR (video cassette recorder) or DVD (digital versatile disk):

❑ No VCR/DVD ❑ Daily ❑ Sometimes ❑ Never

11. Using a PC (personal computer) to play computer games:

❑ No PC ❑ Daily ❑ Sometimes ❑ Never

12. Using a PC to play educational games or use educational software:

❑ No PC ❑ Daily ❑ Sometimes ❑ Never

13. Using a games machine (e.g. Sony Playstation) to play computer games:

❑ No games machine ❑ Often ❑ Sometimes ❑ Never

14. Using a games machine to play educational games or use educational software:

❑ No games machine ❑ Daily ❑ Sometimes ❑ Never

15. How many computers are there at your home (including laptops)? _____

PART 3: HOW OFTEN YOU USE THE FOLLOWING COMPUTER SOFTWARE PROGRAMS AT HOME

16. Word-processing for private use/ fun:

❑No PC (for word processing) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

17. Word-processing for schoolwork:

❑No PC (for word processing) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

18. Drawing for fun (e.g. *Ms Paint/ Adobe Photoshop* or *CAD*):

❑No PC (for drawing) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

19. Drawing software for schoolwork:

❑No PC (for drawing) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

20. Presentation software for private use/ fun (e.g. *Ms PowerPoint*):

❑No PC (for presentations) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

21. Presentation software for schoolwork:

❑No PC (for presentations) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

22. Spreadsheet programs for private use/ fun (e.g. *Excel*):

❑No PC (for spreadsheets) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

23. Spreadsheet programs for schoolwork:

❑No PC (for spreadsheets) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

24. Database programs for private use/ fun (e.g. *Ms Access*):

❑ No PC (for word processing) ❑ An hour or more ❑ Less than an hour

❑ Hardly ever ❑ Never

25. Database programs for schoolwork:

❑No PC (for databases) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

26. Electronic references for private use/ fun (e.g. an encyclopaedia or dictionary):

❑No PC (for databases) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

27. Electronic references for schoolwork:

❑No PC (for references) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

28. Website development programs for private use/ fun (e.g. *Notepad, Ms Word, Front Page*):

❑No PC (for website development) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

29. Website development programs for schoolwork:

❑No PC (for website development) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

30. E-Mail for private use/ fun:

❑No PC (for e-mail) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

31. E-Mail for schoolwork:

❑No PC (for e-mail) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

32. Surfing the Internet for fun, looking for information:

❑No PC (for web surfing) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

33. Surfing the Internet, looking for information for schoolwork:

❑No PC (for web surfing) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

34. Educational software for private use/ fun (e.g. arithmetic, mathematics or science programs):

❑No PC (for educational programs) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

35. Educational software for schoolwork:

❑No PC (for educational programs) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

36. Taking part in discussion forums on the Internet:

❑No PC (for discussion forums) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

37. Visiting chat rooms on the Internet:

❑No PC (for chat rooms) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

38. Playing online games (e.g. strategy, role playing, action, adventure, and puzzle games):

❑No PC (for word processing) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

39. Writing computer programs for private use/ fun:

❑No PC (for writing programs) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

40. Writing computer programs for schoolwork:

❑No PC (for word processing) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

41. Blogging/ Weblogging on the Internet (used for writing posts to a community website on public issues, or for keeping a personal public diary):

❑No PC (for blogging) ❑An hour or more ❑Less than an hour

❑Hardly ever ❑Never

PART 4: THE COMPUTER SOFTWARE PROGRAMS THAT ARE USED AT YOUR SCHOOL

42. Word-processing (e.g. *Ms Word, WordPad* or *WordPerfect*):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

43. Drawing (e.g. *Ms Paint/ Adobe Photoshop* or *CAD*):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

44. Presentation software (e.g. *Ms PowerPoint*):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

45. Spreadsheet programs (e.g. *Ms Excel*):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

46. Database programs (e.g. *Ms Access*):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

47. Electronic references (e.g. an encyclopaedia or dictionary):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

48. Website development programs (e.g. *Notepad, Ms Word, Front Page*):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

49. E-Mail:

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

50. Surfing the Internet, looking for information:

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

51. Educational software (e.g. arithmetic, mathematics or science programs):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

52. Taking part in discussion forums on the Internet:

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

53. Visiting chat rooms on the Internet:

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

54. Playing online games (e.g. strategy, role playing, racing, action, adventure, text-based adventure and puzzle games):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

55. Writing computer programs:

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

56. Blogging/ Weblogging on the Internet (used for posting information to a community website on public issues, or for keeping a personal diary in public where others can read it and comment on it):

❑No PCs at my school ❑Yes ❑No ❑I'm not sure

PART 5: E-LEARNING FACILITIES AT YOUR SCHOOL

57. Multimedia devices (e.g. radios, TVs, VCRs, DVD and satellite TV)

❑No multimedia devices at my school ❑Yes ❑No ❑I'm not sure

58. *Freestanding* computers (computers not linked to one another on a network)

❑No freestanding computers at my school ❑Yes ❑No ❑I'm not sure

59. *Networked computers* linked to one another *on an Intranet*, but **not** to the Internet (i.e. only linked to one another via a local server)

❑No Intranet-linked computers at my school ❑Yes ❑No ❑I'm not sure

60. Networked computers *linked to the Internet* (a world-wide network of computers)

❑No Internet-linked computers at my school ❑Yes ❑No ❑I'm not sure

61. If you and your colleagues could use the Internet to find information about school projects and to cooperate on projects with learners at overseas schools, how would you feel about it?

It would be: ❑ Excellent ❑ Good ❑ Bad ❑ Very bad

62. If you and your colleagues could use a direct two-way TV link with other schools so that you could take part in live debates and quizzes against learners of other schools, how would you feel about it?

It would be: ❑ Excellent ❑ Good ❑ Bad ❑ Very bad

63. If your school could get access to a TV channel on which the main subjects of your curriculum are taught during school hours by experts who use multimedia (images and sound), how would you feel about this as an additional form of teaching, not replacing the work done by you?

It would be: ❑ Excellent ❑ Good ❑ Bad ❑ Very bad

64. If you could use electronic libraries on the Internet to read electronic books, encyclopaedias, dictionaries, newspapers and magazines, how would you feel about it?

It would be: ❑ Excellent ❑ Good ❑ Bad ❑ Very bad

65. If you could watch videotaped lessons during non-contact periods/ free periods, to help you with your schoolwork, how would you feel about it?

It would be: ❑ Excellent ❑ Good ❑ Bad ❑ Very bad

66. If you could use a computer to set exercises and tests in subjects like mathematics, physics and history, during free periods, how would you feel about it?

It would be: ❑ Excellent ❑ Good ❑ Bad ❑ Very bad

67. If it could be possible for the KZN Minister of Education, after having made the appropriate prior arrangements, to appear on a TV screen in classrooms of your school, instead of visiting you in person, how would you feel about it?

It would be: ❑ Excellent ❑ Good ❑ Bad ❑ Very bad

68. If computer science/ computer studies were available as a matric subject at your school, would you recommend it as a matric subject?

❑ Yes ❑ No ❑ Unsure

69. How much formal training has the KZN DoE provided to you in computer literacy as part of your core teaching responsibilities?

❑ Advanced ❑ Intermediate ❑ Basic ❑ None

70. How much informal instruction in computer literacy have you and your colleagues provided to one another about things that interest you as a group of friends (e.g. website design or computer animation)?

❑ Advanced ❑ Intermediate ❑ Basic ❑ None

71. How much training in computer literacy have you undergone privately on your own initiative?

❑ Advanced ❑ Intermediate ❑ Basic ❑ None

72. Mark all of the forms of e-education for which your computer experience has prepared you?

❑ No training ❑ Preparing learning materials ❑ Record keeping

❑ e-Mail ❑ Sending and receiving electronic notices and memos in school

❑ Multimedia presentations (e.g. *PowerPoint* presentations) in class using a computer, a media projector and a screen

❑ Multimedia presentations of Internet websites in class

73. How useful could the following technologies be to you in your schoolwork?

- VCR connected to a TV: ❑Very useful ❑ Somewhat useful ❑ Not useful at all
- Own PC: ❑Very useful ❑ Somewhat useful ❑ Not useful at all

- PC network: ❑Very useful ❑ Somewhat useful ❑ Not useful at all
- Satellite TV/ DStv: ❑Very useful ❑ Somewhat useful ❑ Not useful at all
- Internet (& e-mail): ❑Very useful ❑ Somewhat useful ❑ Not useful at all

74. Do you think the use of the above-mentioned electronic technologies would help or hinder the learning process?

❑Help ❑ Hinder ❑ I'm not sure

75. How much computer literacy training have you undergone as part of your higher education?

❑ Advanced ❑ Intermediate ❑ Basic ❑ None

76. Which software program/s do you use for record keeping at your school (please mark all appropriate options)?

❑ None ❑ I'm not sure ❑ ❑ spreadsheet program like *Microsoft Excel*

❑ database program like *Microsoft Access* ❑ custom program written by the person that our school employs to manage our record keeping

❑ A commercially available program (like *School Management Software*) that we use to manage all aspects of record keeping from marks entry to report card generation

77. What subject/s do you teach (or in the case of principals who are not teaching at the moment), did you teach?

- _____ _____
- _____
- _____ _____

78. How many years do you plan to teach before you retire: _____

79. Are there any additional comments that you wish to make about Government's decision to introduce e-education in South African schools?

_____

_____

_____

_____

_____

For Office Use Only: Respondent Code: _____ School Code: _____

Confidential Survey of Educators
At Public Schools in KwaZulu-Natal Regarding Cell Phone Usage

How often I use cell phones at home and at school

Researcher: Ms Y.N.Matsemela (Reg No 204002112)
Study leader: Prof. Rembrandt Klopper
(Mobile: 0844466662, eMail: rklopper@ukzn.ac.za)
School of Information Systems & Technology
University of KwaZulu-Natal

Over the past decade South Africans have adopted the use of cell phones/ mobile phones at one of the fastest rates in the world. A large variety of cell phones are available, that enable the user to do much mort than jus phoning. Black consumers have played a significant role in trends of cell phone use. We need your help to determine how learners use cell phones. A *basic* cell phone is one that only allows one to phone and send SMS messages. An *advanced* cell phone allows one to phone, SMS, chat, take photos or videos, set alarms or reminders, play music and surf the Internet, etc.

How to complete the questionnaire

1. Please answer the questions as truthfully as you can. Also, please be sure to read and follow the directions for each part.
2. We can only use your answers if you give us permission to do so.
3. We are only asking you about things that you and your colleagues should feel comfortable telling us. However, if you don't feel comfortable answering a question, you can leave it blank. For those questions that you do answer, your responses will be kept confidential.
4. Please mark your answers with a PEN (not a pencil).
5. Tick only one option per question or fill in the required information.

Thank you very much for being willing to complete this questionnaire.

You have to give us permission to use your answers. Your personal particulars will remain confidential.

Consent

I _____(name and surname) hereby confirm that I understand the contents of this document and the nature of the research project, and I hereby agree to participate in the research project, *provided that my personal identity or the identity of the organization for which I work are not revealed in the final published research report*. I understand that I can withdraw from the project at any time, should I so desire.

Name: _____ Signature: _____ Date: _____

PART 1: YOUR PERSONAL PARTICULARS

More advanced communication functions	Regularly	Sometimes	Rarely	Never
g. Send and receive e-mail messages				
h. Send videos				
i. Send birthday wishes				
j. Send Christmas messages				
Personal convenience functions				
k. Alarm clock				
l. Calculator function				
m. Reminders function				
n. Time of the day/ clock function				
o. Calendar				
p. Organiser				
Entertainment/ business convenience functions				
q. Access Internet for fun				
r. Access Internet for online shopping				
s. Access Internet for mobile banking				
t. Play/ download games				
u. Download ringtones				
v. Download music/videos via Bluetooth				
w. Take photos				
x. Send photos				
y. Make videos				
z. Listen to the radio				
aa. For voice recording				
bb. Pass on humorous messages				
cc. Receive notices/ adverts from shops				
dd. GPS (Global Positioning System) tracking				

18. Do you think learners' use of cell phones is disruptive during lessons?

❑ Yes ❑ No ❑ Unsure

19. Do you think cell phones carried by learners invite muggings on them by criminals?

❑ Yes ❑ No ❑ Unsure

Thanks again for helping us with this survey!

ADDENDUM 4: SIGNIFICANCE TABLES

ANOVA

		Sum of Squares	df	Mean Square	Sig.
V4.1	Between Groups	.282	2	.141	.854
	Within Groups	111.210	125	.890	
	Total	111.492	127		
V4.2	Between Groups	.715	2	.358	.665
	Within Groups	110.277	126	.875	
	Total	110.992	128		
V4.3	Between Groups	.085	2	.042	.958
	Within Groups	125.125	126	.993	
	Total	125.209	128		
V4.4	Between Groups	2.267	2	1.134	.324
	Within Groups	129.507	130	.996	
	Total	131.774	132		
V4.5	Between Groups	.694	2	.347	.698
	Within Groups	118.512	123	.964	
	Total	119.206	125		
V4.6	Between Groups	1.731	2	.865	.397
	Within Groups	116.144	125	.929	
	Total	117.875	127		
V4.7	Between Groups	3.182	2	1.591	.140
	Within Groups	98.866	124	.797	
	Total	102.047	126		

ANOVA

		Sum of Squares	df	Mean Square	Sig.
V4.8	Between Groups	3.837	2	1.918	.116
	Within Groups	112.133	128	.876	
	Total	115.969	130		
V4.9	Between Groups	1.210	2	.605	.541
	Within Groups	120.663	123	.981	
	Total	121.873	125		
V4.10	Between Groups	.289	2	.145	.839
	Within Groups	99.646	121	.824	
	Total	99.935	123		
V4.11	Between Groups	2.706	2	1.353	.236
	Within Groups	116.596	126	.925	
	Total	119.302	128		
V4.12	Between Groups	8.236	2	4.118	.021
	Within Groups	125.401	121	1.036	
	Total	133.637	123		
V4.13	Between Groups	.983	2	.491	.661
	Within Groups	147.822	125	1.183	
	Total	148.805	127		
V4.14	Between Groups	.145	2	.072	.901
	Within Groups	89.575	129	.694	
	Total	89.720	131		

Correlations

		V2.1	V2.2	V2.3	V2.4
V1.1	Pearson Correlation	.253**	.252**	.000	-.099
	Sig. (2-tailed)	.000	.001	.997	.173
	N	189	185	192	190
V1.2	Pearson Correlation	.174*	.244**	.022	-.087
	Sig. (2-tailed)	.017	.001	.763	.233
	N	188	184	191	189
V1.3	Pearson Correlation	.027	.093	-.003	.030
	Sig. (2-tailed)	.717	.217	.966	.686
	N	182	177	185	183
V1.4	Pearson Correlation	.034	.067	.101	.156*
	Sig. (2-tailed)	.638	.368	.162	.031
	N	189	184	192	191
V1.5	Pearson Correlation	.055	.047	.107	.167*
	Sig. (2-tailed)	.449	.522	.136	.020
	N	192	187	195	193

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

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