

PERCEPTIONS AND CONCEPTIONS ABOUT E-EDUCATION AMONG LEARNERS IN KWAZULU-
NATAL

By

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Abstract

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This research project forms part of a comprehensive coordinated project to determine whether it is feasible to introduce e-Education in KwaZulu-Natal (KZN) public schools by 2013, as envisaged in the Department of Education's 2003 White Paper on e-Education. This project mainly focuses on human problems that need to be solved among learners in urban schools of KZN for e-Education to be introduced successfully.

The following problems are under investigation:

1. Before e-Education can be introduced in public schools in KZN by 2013 it must be empirically established whether learners are ready to learn effectively in an electronically managed educational environment.
2. Before the South African education and training authorities can establish clear standardized e-learning evaluation criteria it must first be established whether such criteria exist abroad, and if they do, how they are to be applied in the emerging South African e-education context.
3. Before e-Education can be introduced in public schools in KZN it must be determined what e-Education facilities are available in public schools in KZN, to serve as base line for what facilities need to be provided to schools by the educational authorities in order for e-education to succeed.

This research used a quantitative research method to ascertain what the attitudes of learners in the Umlazi District of the Ethekwini Region in KZN, are towards e-Education. The research instrument that was used was a questionnaire to collect data. 800 questionnaires were disseminated and retrieved personally by the researcher at six approved schools. The survey was conducted among learners in Grade 9 and 11 from a random selection of urban schools in the Umlazi District by the researcher, fellow researchers and the supervisor. The researcher used all 800 responses to set up the data base. The statistical program SPSS 13 was used to process and analyze the data that was collected.

The following major findings emanate from this study:

1. No significant prior empirical research has been done about the state of e-readiness of learners in KwaZulu-Natal public schools.
2. The vast majority of learners are very positive about studying in an e-education environment.
3. Very few learners have been exposed to any form of e-education.
4. According to a case study reported, neither teachers nor learners were able to make effective use of sophisticated and expensive active boards that were donated by the British Department of Trade and Industry.

Declaration

With the signature below I, Zandile Roseline Mazibuko, 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.


Z.R. Mazibuko, 204002219

01-04-09
Date

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Terms, Acronyms and Abbreviations

In this section the researcher provides full terminology for acronyms and abbreviations in order to assist readers in understanding terms used in this study. Most of these terms are explained in greater detail in the literature survey in chapter two.

CAA: Computer Aided Assessment

CAI: Computer Aided Instruction

CAL: Computer Aided Learning

CBL: Computer Based Learning

CBT: Computer Based Training

CD-ROM: Compact Disc-Read-only Memory

CIC: Community Information Centre

CMC: Computer-Mediated Communication

EMIS: Education Management Information Services

EPSS: Electronic Performance Support System

E-START: e-School Technology Assessment Readiness and Targets

FET: Further Education and Training

GET: General Education and Training

HCI: Human- Computer Interface

HOTS: Higher-order-thinking skills

ICT: Information and Communication Technology

LAN: Local Area Network

LT: Learning Technology

MPPC: Multi-Purpose Community Center

NEPAD: New Partnership for Africa's Development

NGO: Non-Governmental Organization

NQF: National Qualification Framework

OBE: Outcomes-Based Education

PC: Personal Computer

PLC: Power Line Carrier

SMMEs: Small, Medium, Micro Enterprises

USA: Universal Service Agency

VANS: Value-Added Network Service

WBI: Web-Based Instruction

WBT: Web-Based Training

WEF: World Economic Forum

WITSA: World Information Technology and Services Alliance

WPAN: Wireless Personal Area Network

WLAN: Wireless Local Area Network

WMAN: Wireless Metropolitan Area Network

Wi-Fi: Wireless Fidelity

www: world wide web

SMT: School Management Team

SPSS: Statistical Program

Chapter 1

Statement of Problems and Research Design

1.1: Introduction

In 2003 the South African Government published the White Paper on e-Education according to which all South African public schools should operate as electronically managed schools. This study forms part of a trans-disciplinary coordinated research project, which aims to determine what the requirements are for the successful introduction of e-Education in public schools in KwaZulu-Natal (KZN). The overall project is being conducted within the framework of e-readiness (Economist Intelligence Unit in cooperation with the IBM Institute for Business Value 2005, Bridges.org 2005). This specific project focuses on the degree of e-readiness among a representative sample of learners in urban communities of KZN namely learners in the Umhlabi District of the Ethekwini Region of the KwaZulu-Natal Department of Education.

1.2: Statement Of problems

The overall problem of the degree of e-readiness of learners in KZN urban public schools are restated as a number of sub-problems so that they can be addressed individually. The problem of the degree of e-readiness of learners, forms part of a set of human problems that need to be solved before e-Education can be introduced successfully.

1.2.1: Problem 1

Before the South African education and training authorities can establish clear standardized e-learning evaluation criteria it must first be established whether such criteria exist abroad, and if they do, how they are to be applied in the emerging South African e-Education context. The researcher will con-

tribute to the solution of this problem by means of a literature survey that will use existing print media references, and that will also employ the most recent electronic journal references available through the electronic databases of the University of KwaZulu-Natal (UKZN).

1.2.2: Problem 2

Before e-Education can be introduced in public schools in KZN by 2013 as proposed in the South African Government's White Paper on e-Education (Government Gazette, 2 September 2004) it must be empirically established whether learners are ready to learn effectively in an electronically managed educational environment. The researcher will contribute to the solution of this problem by means of empirical fieldwork among a representative sample of learners in urban schools. The procedure is outlined later in this chapter.

1.2.3: Problem 3

Before e-Education can be introduced in public schools in KZN it must be determined what e-Education facilities are available in public schools in KZN, to serve as base line for what facilities need to be provided to schools by the educational authorities in order for e-Education to succeed. The researcher will contribute to the solution of this problem by means of an empirical survey among a representative sample of learners that will help establish what facilities there are in the schools being surveyed.

1.3: Aims

This research will contribute to a comprehensive, coordinated research project that is being done by a team of researchers for the introduction of e-Education in KZN urban and rural public schools. This dissertation will also contribute to the overall aim of the project to determine whether it is feasible to introduce e-Education in KZN schools.

In this dissertation the researcher have 5 specific aims based on the problem of the degree of e-readiness of learners that need to be addressed before e-Education can be introduced successfully. Aim 1 and 3 are relevant to sub-problem 1. Aim 2 is relevant to sub-problem 2. Aim 4 and 5 pertain to sub-problem 3.

1.3.1: Aim 1

To determine the perceptions (values, beliefs and attitudes) about e-Education and e-Learning among Zulu urban secondary school learners at public schools in the Umlazi District of the KwaZulu-Natal Department of Education.

1.3.2: Aim 2

To further determine to what extent the before-mentioned Zulu public school learners have been using e-Education and e-Learning in school settings (where the former is a more comprehensive process directed by educators and the latter a more specific process that enables learners to do self-directed learning).

1.3.3: Aim 3

To document the perceptions of such learners about the relationship between e-Education and other modes of education delivery (e.g. formal teaching, the use of TV transmissions, pre-recorded video materials, seminars, controlled experiments and field trips).

1.3.4: Aim 4

To determine to what extent such learners have been utilizing educational and edutainment software for formal and informal learning.

1.3.5: Aim 5

To determine to what extent such learners use the Internet to access learning materials that relate to formal studies and private use.

1.4: Research questions

The following research questions regarding the e-readiness of public school learners will be answered at the end of this dissertation, based on the results of the empirical results that will be reported in this study: The following research questions 1 and 3 will be more focusing on the perceptions of learners about e-Education. Research questions 2, 4 and 5 will be focusing on the conceptions of learners towards e-Education.

1. What are the perceptions and conceptions about e-Education among urban Secondary school learners at public schools in and around Durban?
2. To what extent have learners around Durban been using e-Education and e-Learning in school settings?
3. What are the perceptions and conceptions of learners about the relationship between e-Education and other models of education delivery in an e-Education setting?
4. To what extent have learners been utilizing commercial education and edutainment software for formal and informal learning?
5. To what extent have the Zulu public school learners in townships been using the Internet to access learning material that relate to formal studies and private use?

1.5: Research design

Permission to undertake the study was obtained from the relevant authorities (The Research Strategy, Policy Development and EMIS Directorate). The data was collected using face-to-face filling in of the instrument. The instrument used was a questionnaire developed by the researcher with the assistance of fellow researchers and approved by the academic supervisor. This

was guided by the literature survey (Nexus Search), which showed that currently there is no research going on concerning this topic. The study will address variables such as attitudes and perceptions towards e-Education. The researcher collected data using 800 questionnaires distributed to a selected group of public school learners.

1.5.1: Research methodology

The researcher utilized the following research procedures to find solutions to the three problems that were identified earlier on:

- The quantitative research method was utilized to ascertain what the attitudes of learners in the Durban region are towards e-Education (directed learning and electronic education management) and e-Learning (self-directed learning) in current as well as envisaged future e-Education settings.
- The research was conducted in terms of a memorandum of understanding between the University of KwaZulu-Natal (UKZN) and the KZN Department of Education (KZN DoE), according to which the latter allows access to its facilities for researchers.
- This research utilized the services of the Ethekewini Region's Education Management Information Systems (EMIS) to determine what the size of the research sample needed to be.
- The supervisors were requested to facilitate permission from the Director of Research Policy and Education Management Information Systems for KZN to give permission to conduct the research in public schools in the Durban Region.
- This researcher used a questionnaire, which has been constructed with the assistance of fellow researchers and approved by the academic supervisor of the project, to conduct this research at approved schools.

- The statistical program (SPSS) 13 was used to process and analyze the research results.

1.5.2: Data collection

The researcher used a questionnaire, which has been constructed and standardized with the assistance of fellow researchers and approved by the academic supervisor, to collect data. The permission to conduct research among grade 9 and 11 learners in the Umlazi Circuit was obtained from the relevant educational authorities in the Ethekwini Region of the KZN department of education.

800 questionnaires were disseminated and retrieved personally by the researcher at six schools, which were randomly selected by the researcher, fellow researchers and the supervisor. The researcher used the 800 responses to set up the database in the SPSS 13 to process and analyze the data that was collected.

1.5.3: Data analysis

The researcher used the SPSS 13, which is a spreadsheet-format database that consists of rows and columns to analyze and interpret data captured from the responses of the respondents. Tables and graphs that were extracted from the SPSS 13 were used to interpret and analyze the data. The researcher analyzed the data received to know and understand the perceptions and conceptions about e-education among secondary learners in KZN urban settings.

1.6: Overview of dissertation

In chapter one the researcher presented an overview of this dissertation by stating how it was organized, and outlined the statement of the problems and the research procedure.

Chapter two deals with the Literature Survey. This includes the role of the Concept Matrix in the literature survey, literature pertaining to theory and

how ICT could contribute to electronic education. The survey includes a synthesis of the theoretical framework and characterization of the research methodology.

Chapter three presents an account of the Research Methodology that was employed to conduct the research.

In chapter four the researcher explains the results of the survey. An account of the findings is presented through the use of graphs and tables that were extracted from the SPSS 13.

The final chapter presents an overview of this dissertation, and demonstrates to what extent the empirical results enabled the researcher to answer the research questions, thereby meeting the research objectives. Finally the appropriate limitations on the validity of the results of the research are presented and recommendations made with regard to e-Education.

1.7: Conclusion

In this chapter the researcher outlined the problems regarding the introduction and management of e-Education in developing as well as developed South African public schools. The researcher stated the aims of this research and explained the research methodology that was used to find solutions to these problems in order to meet the aims of this research project.

In the following chapter the researcher will discuss the various sources that were consulted to gather information and provide a more detailed literature study on the topic being researched.

Chapter 2

Literature Survey

2.1: Introduction

In this chapter the researcher reports the results of the various types of literature review that was conducted in order to determine (1) what the most appropriate theoretical framework is to constrain the interpretation of her own empirical research results, (2) what the best research methodology is to employ in order to conduct the empirical research, and (3) to what extent the problems identified in the first chapter have been addressed by research in South Africa and abroad, so that they can be removed from the research equation by reformulating the initial problem statement.

The researcher used the following search engines, which are available in the University of KwaZulu-Natal (Westville Campus Durban):

- The researcher used the library's electronic database records to do a Nexus search, which showed that there were no ongoing or completed projects at other South African institutions of Higher Education concerning this topic. The Nexus search was done on the following dates: 29 March 2004, 04 April 2004, 25 June 2004, 03 September 2004, 20 June 2005 and 27 September 2005.
- The researcher used the OPAC search engine to identify relevant textbooks on the university's library shelves. The researcher managed to identify only one textbook, which is relevant to the topic.
- In June 2004 the researcher used the library's electronic database records to do a Science Direct search to identify electronic articles that appeared in peer reviewed scholarly journals. Under this

search engine the researcher identified only two books which are relevant to the topic.

- In June 2004 and September 2005 the researcher used Goggle search facilities for more information about the topic, like Google Advanced Search, Scholar Google, Google Suggest and Google Print. The researcher discovered only eight relevant books from Google Advanced Search.

2.2: The Role of the Concept Matrix in the Literature Survey

The researcher constructed a Concept Matrix, given under Addendum 3, to present a bird's-eye perspective of the references used in this chapter. The researcher determined the relevance of literature in relation to the research project by assessing the abstracts and conclusions of references, based on the search terms that were used for each of the above-mentioned database searches. Only references that appear on the concept matrix have been included in the bibliography of the dissertation. Furthermore, the researcher does not refer to any references in subsequent chapters, other than those used in the literature survey.

2.3: Literature Pertaining to Theory

The purpose of this section is to introduce the readers to the appropriate theoretical framework that was used to solve the problems identified in the first chapter of this study. The researcher will review literature to describe a set of conclusions and recommendations in the context of implementing Information and Communication Technologies in urban secondary schools in KwaZulu-Natal.

2.3.1: What is E-readiness?

McConnell International LLC in collaboration with the World Information Technology & Services Alliance (WITSA) (2000; 2001) discusses e-readiness as the degree to which a society is qualified to participate in the Networked World. McConnell International (2000/1) provide a global over-

view of 53 countries on who is e-ready, who is taking action, and what is working in making the pathway to economic growth, financial success and digital inclusion. They discovered that numerous countries are working to expand and upgrade their communication networks. They also found that in developing countries like South Africa modern information and communication technologies could offer improvement in the speed and efficiency with which the government communicates with its citizens. McConnell International published e-readiness rankings for 53 countries by assessing five inter-related components:

- Connectivity - are networks easy and affordable to access and to use?
- E-Leadership - Is E- Readiness a national priority?
- Information Security - Can the processing and storage of networked information be trusted?
- Human Capital - Are the right people available to support e-business and to build a knowledge-based society?
- E-Business Climate - how easy is it to do e- business today?

McConnell International (2000/1) acknowledges that developing countries would need time before the projects, opportunities and partnerships considered in this analysis will change a nation's e-readiness ratings. According to the McConnell International (2000/1) ratings assessment South Africa is number 42 out of 53 countries.

The Economist Intelligence Unit (2005) also uses six interrelated components to assess the current state of e-readiness for each country. The Unit publishes an annual e-readiness ranking of the world's largest economies which currently includes 65 countries assessed on their ability to promote and support information and communication technology (ICT) services. In their rankings they included areas of Internet Security, ICT spending and e-

education. The Economist Intelligence Unit (2005) uses the following components for the assessment of each country's e-readiness:

- **Connectivity and Technology Infrastructure** - Connectivity measures the access that individuals and organizations have to personal computers and the Internet. The connectivity category is weighted more heavily towards broadband penetration and is a reflection of its growing importance for ICT development.
- **Organizations Environment** - The Economist Intelligence Unit screens 70 indicators covering criteria such as the strength of the economy, political stability, the regulatory environment, taxation, the quality of infrastructure and openness to trade and investment to evaluate the general organization a climate.
- **Consumer** - the e-readiness rankings assess how prevalent an ICT practice is, in each country.
- **Legal and Policy Environment** - ICT development depends both on a country's overall legal framework and specific laws governing Internet use.
- **Social and Cultural Environment** - Basic education and literacy are preconditions to being able to utilize Internet services, but this category also considers a population's e-literacy.
- **Supporting E-Services** - No organization can function efficiently without intermediaries' services to support it.

Bridges .Org (2005) concur with both McConnell International (2000/1) and The Economist Intelligence Unit (2005) by pointing out that e-readiness assessments are the first phase and the foundation for strategy and action plans, and that it is important that a comprehensive look at e-readiness combines assessment of the society and economy (e.g. healthcare, schools and business), with analysis of socio-economic divisions (e.g. ethnicity, income and gender). Bridges.Org (2005) also insists that if the socio-economic

issues are not studied and addressed, then practical use of ICT would remain a tool for the privileged few. According to Bridges.Org there is a wide range of other resources that can be used as assessment tools to assess a nation's e-readiness and to establish the level of preparedness of participants in the global knowledge economy. These tools are:

- Ready-to-use-tools (Questionnaires) - These are used to produce ratings from which communities or countries are supposed to identify where they fit.
- Case Study - There are numerous case studies assessing specific countries' e-readiness and many of these could be used as bases for e-readiness tools.
- Third Party Surveys and Reports - These reports aim to rank and rate countries on various measures held to indicate e-readiness or e-competitiveness. This guide measures the availability, speed and quality of network access, use of ICT in schools, work place, economy, government and everyday life.

Bridges.Org (2005) also point out that e-readiness is a complex and multifaceted phenomenon and there is a lot that need to be considered to assess a nation's e-readiness.

2.3.2: Information and Communication Technology for Development

The South African White Paper on E-Education (2004) states that Information and Communication Technologies (ICTs) can be used as a tool for development in Africa. In order to address the problem of underdevelopment, Africa has adopted a renewal framework, the New Partnership for Africa's Development (NEPAD), which identifies ICTs as central in the struggle to reduce poverty on the continent. The White Paper notes that the use of ICTs can provide hope for overcoming barriers of social and geographical isolation, increase access to information and education and enable the poor to participate in the making of decisions that have an impact on their lives.

Within education and training NEPAD recognizes the vital role of ICTs in the establishment of regional distance learning and health education programs to improve the situation in the health and education sectors.

According to the Markle Foundation (2001) information and communication technology can be used as a holistic approach for development. The Markle Foundation supports the White Paper by stating that ICT can be a powerful enabler (tool) for development because of its unique characteristics. ICT can dramatically improve communication and exchange of information. It can also strengthen and create new economic and social networks and development in developing countries. ICT can allow remote communities to become integrated into global networks and make information, knowledge and culture accessible in theory to anyone. Through the creation and expansion of networks, ICT can transcend cultural and linguistic barriers by providing individuals and groups with the ability to live and work anywhere.

Quaynor (2002) supports the White Paper in that ICT can be used as a tool for development. He points out that the ICT vision for Africa is to reveal ICT and the Internet, in particular, as an empowerment tool in the social and economic transformation of the region. He further states that the ICT vision for Africa is a three-step vision: it is intended to transform Africa from a Learning society to a Knowledge society and finally to a Wise society. Quaynor supports the Markle Foundation by saying that the first step is to empower people while ICT is positioned as a management instrument for economic development and access for learning in the different societies; a society with a culture of learning is the result. In the second step knowledge products and services are focused as the economic output of ICT institutions in a sector. In this phase the use of information and a culture of innovation and creation are encouraged as social values; a knowledge society is the result. In the final step, a sustainable economy is built around knowledge products by securing the intellectual property that is uniquely African while ensuring that the quality of life is enhanced socially with the benefit of ICT.

Klopper *et al.* (2005) support Quaynor (2002) in that ICTs have the capacity to decrease marginalization and empower people fully by giving access to information. They also state that the introduction of ICTs, in combating the digital divide in the community, would provide isolated individuals with the opportunity to communicate. They argue that special attention needs to be given to the least developed countries (especially Sub – Saharan Africa), with financial resources, physical infrastructure, and a knowledge base to achieve sustainable development goals. By implementing ICTs in working environments, employees directly promote technological changes in their organization and indirectly in society in general.

Merridy (n.d.) fully concur with the Markle Foundation in that ICTs have been shown to have development applications in education, governance, environmental monitoring, health, human rights promotion, economic growth and other areas. According to Merridy there is no more critical question facing the developing world than how to face the challenges and opportunities offered by the information and communication technologies and particularly the phenomenon of the Internet. He believes that ICT is transforming everything it touches, from politics to business, culture, education and health. He finally argues that ICT can certainly be an important tool for dealing with development issues but without political and economic changes at both international and national levels, these technologies alone are not going to solve a country or region's development challenges.

Jacobs *et al.* (2002) state that Information and Communication Technology is changing every facet of life, and thus changing how people live. The statement supports Merridy as these changes impact on the way information and communication technology is utilized in multi-purpose community centers. They argue that not only do people need to understand the evolution of the new ICTs, but they also need to keep pace with the rapid changes imposed by ICTS on the social structure at work, at home, in the classroom and in the entertainment field. They also note that it is necessary to shape the African information society by harnessing the key information, communication

technologies and skills required for the continent's socio-economic development. If Africa does not become a major player in ICT, its countries will struggle to compete globally.

Particular aspects of ICT for development are discussed in greater detail in the sections that follow.

2.3.2.1: Access to ICT Services

According to Finley (2005) the Universal Service Agency (USA) is a key state-associated organ for addressing universal access, and is one of a basket of initiatives in the government push to bring information and communication technologies (ICT) to disadvantaged communities. He points out that training is an essential component of community access initiatives that in many instances has not been adequately planned for in the South African context. He states that the rural-urban divide is evident in community access initiatives and training is no exception. Urban centers experience a higher skills base amongst trainees, better access to information and resources and a greater sense of networking and support. Rural people have often not seen a real computer, many do not know to start one up, and some are not aware that there is more to a personal computer (PC) than the screen. Urban people, on the other hand, tend to be more skilled.

Klopper *et al.* (2005) agree with Finley that local communities in Third World countries experience problems because of the lack of access to ICT services. The lack of infrastructure in local communities contributes to the lack of access to information. There is a gap between rural and urban local communities in accessing information, with urban communities having easier access to resources (i.e. libraries, computers and Multi-Purpose Community Centers (MPCCs)) that can be used to access information. However, in rural local communities people have no access at all and they fall behind due to a scarcity of resources and because of poor infrastructure.

Sachs (n.d.) supports Klopper *et al.* (2005) by saying that a communication infrastructure is deployed with widely varying local and regional rates of

penetration depending on factors such as geography and income levels. Sachs further argues that without access to global communication networks, no community can participate in a Networked World. Access is determined by a combination of the availability and affordability of the use of the network itself, as well as of the hardware and software needed for network interface. The quality and speed of the network are also important in determining how the network is used. The customer services orientation of access providers is a major factor in network application adoption and usability.

According to the White Paper on e-Education (2004) the impact and effectiveness of ICTs rest on the extent to which the end users have access to hardware, software and connectivity. The White Paper supports the view of Sikhakhane *et al.* (2005) that for e-education to be successful, end users must have regular access to reliable infrastructure.

Tongia (2004) notes that the Power Line Carrier (PLC) system saves on some of the costs of the transformer bypass, and can potentially allow greater sharing of access in the final drop. He argues that the connectivity from the PLC system to the rest of the Internet is typically done through telecom means, through optical fiber, sometimes to the service provider's data center. Utilities often have some connectivity to their substation for control and other purposes, through not at speeds fast enough for broadband Internet provision to consumers.

Chasia (2002) agrees with Tongia (2004) that to bridge the gap between the haves and have nots, African countries need to use new cable systems like fiber optic cables, at an affordable cost that will help Africa to become linked with the rest of world.

Wikipedia (2008) also suggest that the use of wireless network system could be another alternative in improving access to internet. Wireless network refers to any type of computer network that is wireless, and it is associated with a telecommunications network whose interconnections between nodes is implemented without the use of wires. The following wireless network can be

used to increase access to internet (a) Wireless Personal Area Network (WPAN) is a type of wireless network that interconnects devices within a relatively small area. (b) Wireless Local Area Network (WLAN) is similar to other wireless devices and uses radio instead of wires to transmit data back and forth between computers on the same network, e.g. Wi-Fi is a commonly used wireless network in computer systems to enable connections to the internet. (c) Wireless Metropolitan Area Network (WMAN) is a type of wireless network that connects several wireless LANs.

Oyedemi (2003) argues against the perception that providing access to information and communication technology (ICT) devices and infrastructure in semi-urban, rural and remote locales has accelerated the universal service and access program in Africa. Oyedemi uses the holistic approach to extending information and communication technology services. His approach takes cognizance of the socio-cultural landscape and also notes that information and communication technology service extensions should work hand in hand with extension of other social utilities. He points out that he supports the initiative of a universal access wheel which proposes that various elements should be in place, in order to achieve the goal of universal access, especially in Africa. According to Oyedemi it is important to revisit the diverse meanings of universal service and access to information and communication technology services in developing regions of the world, such as Africa.

Hoffman *et al.* (1998) have a different approach by examining racial differences in access and the use of ICT services. They investigate the differences between whites and African Americans in the United States with respect to computer access, which is the current prerequisite for Internet access and website use. They started to examine whether observed race differences in access and use can be accounted for by differences in income and education, how access impacts use, and when race matters in the calculus of equal access. In their investigation they discovered that there are two general differences that could be accounted for by income and education, that is (a) use of

the Web at home, work and at school, and (b) ownership of computer at home, work and at school.

2.3.2.2: How ICT contributes to the Digital Divide

Hartigittai (2002) defines the digital divide as the gap between the haves and have nots. The differences between the haves and have nots regarding access to the Internet, limit its scope to a binary classification of technology use by only considering whether someone does or does not use the Internet. He looks at the differences people have in online skills by assigning search tasks to a random sample of Internet users from a suburban country. Findings suggest that people search for content in a number of ways, and there is a large variance in whether people are able to find various types of content on the web and how long they take to complete online tasks.

Kelly (2004) argues that the digital divide theory is similar to that of a class-based society, in which there is little social mobility. He disagrees with those saying that the digital divide theory is a useful analytical tool for Africa because the ranking among the countries within the continent, as measured by teledensity, should remain relatively stable over time. By analyzing changes in the rankings of the economies over time, it is possible to test the validity of the digital divide hypothesis. The digital divide hypothesis is no longer an accurate predictor of what is happening in the African ICT market. A more accurate description might be digital opportunities where individual nations have shown much greater mobility, in moving up or down the rankings, as measured by effective teledensity.

According to Kozma *et al.* (2003) there are various responses to the question of the digital divide between developed and developing countries in their use of computers to prepare students for the global economy. The World Bank and subsequently the World Links Organization provided schools in developing countries with networked computers and training that supports integration of ICT into teaching. These technologies are currently creating significant disparities between developed and developing countries.

Klopper *et al.* (2005) support Hartigittai (2002) by discussing the digital divide as a gap that exists between individuals who have reasonable opportunities to access technology tools and those that do not have such opportunities. They further state that the digital divide is a complex concept, as it does not only cover Internet access, but also it encompasses anything that accesses information and communication (i.e. computers connected to the Internet, radios, TV, access to telephone and mobile phone networks, etc.).

Klopper *et al.* agree with Kozma *et al.* (2003) that in South Africa the government is trying to bring services to the people as a way of combating the digital divide. They also report that the government is looking at issues like the installation of Multi-Purpose Community Centers (MPCC) throughout the country and the department of education is looking at literacy as a means of helping to bridge the digital divide.

2.3.2.3: How ICT contributes to Community Development

According to Sachs (n.d.) readiness depends upon the community's incorporation of ICTs into the fabric of its activities in order to maximize the gains of joining in the Networked World. In society-at-large, ICTs can have a profound effect upon peoples' professional and personal lives by providing easier access to information, more efficient ways to communicate and powerful organizational tools. He also notes that in order to know what to develop in a community, it is important to know how a community is using ICTs. It is important to assess not only how many members of the community have access to the technologies, but also how they are using them. One of the most important drivers of online growth is awareness. People must first know and understand what the Internet is, in order to participate. Particular attention should be paid to the demographics of Internet users in the community. A community is more ready when there are no large discrepancies in online presence among different groups.

Oyedemi (2003) points out that African countries need to invest in appropriate technologies, which take cognisance of the topography and land-

scape of the region. Copper and cable transmissions have contributed to extending services in Africa. Many people in Africa reside in rural, sometimes rugged, terrain and are consequently excluded from telecommunication cable extension. Copper wire has been used by many developing countries due to its affordability and ease of installation. However, copper wire has disadvantages: the maintenance cost is high and it is not 100% safe from corrosion, rain and theft.

The Markle Foundation (2001) concur with both Oyedemi (2003) and Sachs (n.d.) that ICT can contribute to fostering empowerment and participation and making government processes more efficient and transparent, by encouraging communication and information sharing among people and organizations. They further state that ICT can connect individuals and local communities with information and resources beyond their geographic boundaries, encouraging information dissemination, information exchange and communication. Citizens are encouraged to participate in the demographic process through ICT mechanisms such as electronic forums, which enable participation in public discussions.

The White Paper on e-Education (2004) states that schools must work in partnership with families and the wider community to ensure shared knowledge about ICTs and extended opportunities for and development through ICTs. It further stated that community engagement in ICT planning, implementing and monitoring is crucial for the information, maintenance and security of an e-school. The department of education says that for the community to be developed the e-school will act as a hub for multi-purpose services, such as adult continued learning, primary health care and other local government services. Moreover, community members will aspire to develop community – based small, medium and micro enterprises (SMMEs) to provide maintenance and support services for hardware and connectivity to the e-school.

2.3.2.4: How ICT contributes to Institutional Development

Chasia (2002) states that the New Partnership for Africa's Development (NEPAD) commission will build an e-institution that will bring to bear the necessary skills, effort and resources to make the thin route satellite infrastructure project a reality. They will also focus on the training of trainers and in the improvement of content and curriculum. NEPAD has already approached several institutions and Non-governmental Organizations (NGOs) who are working in these areas for collaborative action.

Quaynor (2002) argues that ICT must be supported and fully established. There is the need to build and support institutions in the public, private and non-profit sectors, many of which have a weak ICT focus. He further argues that African countries are handicapped in their ability to absorb and apply ICT, but these institutions can become repositories of knowledge and behavior as well as enforcers of key processes for society. Institutional capacity is relevant for the sustenance of ICT development in Africa.

2.3.2.5: How ICT contributes to Economic Development

According to Clarke (2003) new technologies need to be offered a chance to develop the economy of the country. He argues that the Power Line Carrier System (PLC) would require quality of service mechanisms that are today not standardized, but this can be expected shortly. However, the total shared bandwidth might be constrained for widespread video usage. He also points out that in the interim, cable systems face difficulties with consumers overusing shared bandwidth, an issue that might plague PLC as well.

Oyedemi (2003) supports Clarke (2003) in that new technologies are needed for development. He reports that copper wire has disadvantages, and that the developing countries can adopt fiber optic cables. Fiber optic cables offer numerous advantages over copper cables: they provide a higher transmission capacity, a broad bandwidth, are easily transportable, immune to electro-magnetic interferences and also provide capacity to transmit all forms of communication. He noted that due to the advantages that the fiber optic ca-

bles offer telecommunication companies around the world are replacing their cable systems with fiber optic cables.

Wikipedia (2008) supports Oyedemi (2003) and Clark (2003) that the use of wireless network is an inexpensive and rapid way to be connected to Internet in countries where the telecom infrastructure is poor or there is lack of resources, as in most developing countries.

Mbarika *et al.* (2005) argue that ICT development relies on how well ICT investments are translated into resources for sustained competitive advantage. Most South African countries will not gain sustained competitive advantages vis-à-vis developed countries. In the near future ICT can create competitive advantages when they allow for cost advantages. Sustaining competitive advantages from an ICT infrastructure requires developing resources that are hard to imitate by other countries, and is very much a function of how ICT infrastructures are adopted, developed and managed.

Cette *et al.* (2001) concur with Oyedemi (2003) by stating that information and communication technology is increasingly referred to as an important engine for economic growth. They use France as an example in response to this question: What is the degree of diffusion of ICT the in French economy and its contribution to growth? There are two possible roles of ICT in the economy: (a) its diffusion and use in all industries, and (b) the development of industries that produce ICT-related goods and services. The diffusion of ICT in the economy is often measured through various quantitative indicators of equipment rate. The French ICT industry represents a share of the productive activity that is relatively very low for computer equipment.

Melody *et al.* (2003) support Clarke (2003) by pointing out that New Value-Added Network Services (VANS) provide the foundation for a wide variety of applications (e-commerce, e-government, e-education, e-health, etc.) that will make up e- economy in the new information societies. Internet services are only a part of the VANS sector. They report that the development of VANS is influenced primarily by three factors, (a) technological im-

provements (b) government policies, and (c) market structure of the VANS sector. Technologically, South Africa is well prepared to lead in VANS development. However, its policies and regulations has been a site of continuous conflict, which has resulted in VANS development being restricted rather than promoted by government policy. If South Africa is to see its information society and e-economy policies implemented, it will have to establish and implement through strong regulation, a commitment to promoting an innovative VANS sector.

Sachs (n.d.) agrees with Cette *et al.* (2001) that business and government are able to effectively employ information and communication technologies and find more sophisticated and efficient ways of managing their external relationships and communications. This growing ICT usage helps form the critical mass of electronic transactions which support a networked economy, both in terms of the network size and the demand for the associated goods, services, and labour and policy forum. A thriving job market for ICT professionals provides added incentive for growth of ICT adoption, training programs and overall use of ICT's within the economy.

According to Clarke (2003) the old economy, poor countries and rich countries were divided by 'object gaps'. Poor countries lacked the requisite raw materials, physical capital (engines, factories, roads etc.) and capital (educated labor) required for economic development. Within the new economy, a different gap exists, that is, an 'ideas gap'. Poor countries lack the ideas or knowledge that is used in industrial countries to generate economic value. In order for the poor countries to achieve e-development they need to overcome the 'ideas gap'.

2.3.2.6: How ICT contributes to Innovation and Change

According to Chasia (2002) the New Partnership for Africa's Development (NEPAD) Commission is talking to possible partners for innovative solutions for the associated ground infrastructure (e.g. satellite terminals, computers and local power systems) in schools. He further states that a num-

ber of satellites in orbit today, owned by different operators, have footprints on the continent of Africa and have transponder capacity that is not currently in use. The commission has approached some satellite operators to discuss the provision of low cost satellite capacity in support of the NEPAD e-institutions project and other requirements.

Jiamton and Sills (2005) argue that technology has been merged into education in almost every aspect and has also been seen as an engine for change. They point out that understanding the process of innovation and change is absolutely crucial, particularly when introducing the innovation to an organization. The study has been focusing on change in educational context and an innovation is not a static object, as it interacts with the context of the organization. There is hope that understanding the process can help to approach or manage change better when it comes to implementation in an institutional context.

Kozma *et al.* (2004) support Chasia (2002) by saying that ICT can make a tremendous contribution to human development. Technological innovation affects human development in two ways. It can directly contribute to human capabilities by increasing people's ability to participate more actively in the social, educational, economic and political life of a community. ICT can also support economic growth through the productivity gains that it generates. Together these two developments can create a virtuous cycle that can reduce poverty and improve the human condition.

2.3.2.7: How ICT could contribute to school level Monitoring and Evaluation

The White Paper (2004) stipulates that regular reviews and periodic evaluations will be conducted to inform the implementation process. The direction and focus will benefit from insights gained and lessons learned from the reviews. It also indicates that evidence of success will be captured against nationally agreed indicators and targets. Each general and further education and training institution will report data on e-school technology assessment readi-

ness and targets (e-START). Data sets will include baseline data, and set targets to become an e-school. The data sets will include information on infrastructure, connectivity, management, teacher development, learner achievement, assessment and educational benefits to be gained from ICT applications in e-schools. The information will be aggregated at district, provincial and national levels.

2.3.2.8: Using ICT to create a Networked World

Sachs (n.d.) analyses a networked world as a world that is engaged in ever-evolving increasingly powerful information and communication technologies (ICTs). This has fundamentally changed the nature of global relationships, sources of competitive advantage and opportunities for economic and social development. Technologies such as the Internet, personal computers and wireless telephony have turned the globe into an increasingly interconnected network of individuals, firms, schools and governments communicating and interacting with each other through a variety of channels.

Sachs (n.d.) also notes that the explosion of this technologically mediated global network has resulted in a world in which virtually everyone, everywhere, has the potential to reap the benefits of connectivity to the network.

2.3.2.9: e-Readiness and Information and Communication Technology for Development are Interrelated Concepts

E-readiness and ICT for Development are interrelated concepts. McConnell International (2000/1) point out that e-readiness is the pathway for ICT to be introduced, and for countries to find out whether they are ready, or taking action, or working towards obtaining the new technologies which is to be introduced. The Economist Intelligence Unit (2005) supports McConnell International by looking at the e-readiness of world countries and their being assessed on their ability to promote and support ICT services. Bridges.org (2005) concur that e-readiness assessments are the first phase and foundation for strategy and action plans towards implementation and the

practical use of the ICTs. E-readiness and ICT are interrelated because communities need to be ready before the introduction of ICT.

Rugbeer (2005) states that communication networks now use digital electronic technologies. This has resulted in new technologies; for instance, telephones can now be programmed like computers to remember numbers. These changes need people to be ready and trained to use these new technologies.

2.3.3: How ICT could contribute to Electronic Education

Ramcharan (2004) reports that in a South African context, the concept of e-Education revolves around the use of information and communication technology to accelerate the achievement of national education goals. E-Education is about connecting learners to other learners, educators to professional support services, and providing platforms for learning. It is envisaged that e-Education will connect learners and teachers to better information, ideas and one another via effective combinations of teaching and learning methodology. Employees can tap into a knowledge base from almost anywhere. Workers or learners are not time bound, they can engage in e-learning at any time—while commuting, traveling, or waiting in line, making distance learning a reality. Interactive support in learning is possible when completing e-degrees, which are become common throughout most institutes of higher learning.

Education for human development in a learning society requires collaborative learning and involves focusing on building knowledge. These changes arise from shifts in educational goals, and from new concepts in learning and knowledge creation. Experience worldwide indicates that information and communication technology does play a pivotal role in transforming the process of education and training. It is noted that information and communication technology can enhance educational reform by enabling teachers and learners to move away from traditional approaches to teaching and learning. In a transformed educational environment there is a shift from teacher-

centered, task-oriented, memory-based education to an inclusive and integrated practice where learners work collaboratively, develop shared practices, engage in meaningful contexts and develop creative thinking and problem solving skills. Field learning can become a great success. Employees can learn on the job, wherever and whenever the information is most useful. Government initiatives are on the increase to promote information and communication technology in schools and industries. It is up to teachers and learners alike to take advantage of the situation and to acquire sound technological skills so that knowledge construction is based on sound reasoning.

According to the White Paper (2004) the concept of e-education revolves around the use of ICTs to accelerate the achievement of national education goals. Education will connect learners and teachers to each other and to professional services, and be platforms for learning. According to the White Paper e-eEducation is more than developing computer literacy and skills necessary to operate various types of information and communication technologies; it is the ability to apply ICT skills to access, analyze, evaluate, integrate, present and communicate information. Success in the infusion of ICTs into teaching and learning will ensure that all learners will be equipped for full participation in the knowledge society before they leave further education and training (FET) institutions.

Brown *et al.* (2004) note that e-education will also integrate the literature on computer anxiety and communication apprehension to determine their joint impact upon individual attitudes toward using and use of Computer-Mediated Communication (CMC). They point out that CMC anxiety is an individual's level of fear or apprehension associated with actual or anticipated use of information technology to communicate with others.

Paul *et al.* (2004) agree with the White Paper that e-Education especially through distance learning can be an instrument in ensuring that future generation leaders are well informed and competent. . Distance learning is any edu-

cation characterized by interaction between agents in geographically remote locations. Distance learning is often ICT-enabled and many programs include computer and Internet training to facilitate the use of essential technology. Therefore, the acquisition of fundamental ICT skills encourages students to explore the Internet on their own, thus multiplying educational opportunities.

Unfortunately the quality of education varies so greatly between regions that the school systems of developing countries often fail to deliver the level of education necessary to ensure such competency. However, developing country schools are often using information and communication technology to participate in distance learning with some success.

2.3.3.1: How ICT could contribute to develop e-Education Policy

According to the White Paper (2004) an e-Education policy will cater for or accommodate every South African learner in the General Education and Training (GET) and Further Education and Training (FET) band to be ICT capable. Learners will be able to use ICTs confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community by 2013. The policy intention is not just to build technical skills, but also to enrich educational experiences across the curriculum. The White Paper states that the main objective of the policy is to build 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.

Gilwald (2004) notes that the policy flux within the education sector is indicative of enormous political and social transformation at the national level and reflective of the rapid changes in global education. He feels that the policy should envisage an education structure that would orientate the sector towards accelerated development and universal service as well as take into account technological and international trends. He also points out that the policy goals need to include a strong focus that takes into account the needs of local communities and development of human resources.

Oyedemi (2003) supports Gilwald (2004) by saying that policy makers are facing a great challenge and national governments in Africa and the whole world need to develop appropriate policies. These policies will have to enhance the universal diffusion of and access to ICT services by adopting a holistic approach that takes cognizance of the social, cultural and political needs of the community at large. He also states that policy is a rule-making mechanism that creates access to affordable services for citizens by enhancing the free flow of information in society and encouraging diversity within the communication sector.

Sachs (n.d.) cites as Oyedemi (2003) by stating that for a community to become ready for the networked world, the policy-makers must realize the implications of their decisions upon ICT adoption and use. Effective regulations should promote competition, ensure affordable pricing for consumers and maximize telecommunication access in the community. Regulations should encourage universal access to ICT services. He also notes that liberalization within the telecommunications sector should establish a regulatory framework that encourages multiple carriers to operate competitively.

2.3.3.2: Using ICT for Content and Curriculum Development

The White Paper (2004) argues that the school curriculum in General & Further Education & Training must be supported through effective and engaging software, electronic content and online learning resources, as well as teachers, content developers and administrators who contribute effectively to the new (ICT) resources. It also states that the Department of Education in collaboration with the Department of Arts and Culture, will promote the adaptation and development of local content into indigenous languages. While there is a large amount of curriculum material and resources available on the Internet, this online content must be evaluated for educational relevance prior to adaptation and possible translation into indigenous languages. It further states that the Department of Education will promote the generation of new electronic content that is aligned with outcomes-based education (OBE).

Oyedemi (2003) states that the role of extending an ICT infrastructure is to facilitate access to a wide range of information that could be useful in the daily lives of people. People must have access to information that will facilitate political, economic and social participation in the community. For millions of people in Africa to benefit from ICT, the content of the information must be conditioned to suit specific needs. He also points out that information on the Internet is predominantly in English, which disenfranchises millions of people in Africa, whose competence in the English language is minimal. African policy makers and information developers should highlight the need for, and help to accelerate the process of, developing content in local languages.

Sachs (n.d.) concurs with Oyedemi when saying that community members find the Internet medium more useful and relevant to their own lives when online content reflects their own interests and needs. Locally relevant content is a major driver of growth of Internet usage and also online content is more relevant when it is available in local languages. English language dominance on the Internet remains a serious problem to the world's non-English speaking communities.

According to Chasia (2002) the principal contact of the majority of the community to Internet and software is through access to content and execution of applications. Chasia reports that the e-Africa commission has initiatives to address these things. He states that in the new content and curriculum development, African languages must be available on the Internet and useable in software applications.

Buckner and Stoner (1999) argue that careful planning at an early stage of introducing learning technologies (LT) into the curriculum will assist in the development of effective implementations which are robust and well managed. Well planned implementations are also more likely to be well received by the community, one of the reasons being that learning with ICT can bring its own rewards and is worth the effort.

2.3.3.3: Using ICT to create e-Schools

The White Paper (2004) notes that in order to achieve the e-education goals, schools will have to develop into learning organizations consisting of a community of both teachers and learners. In such schools teachers and learners will be able to function across three dimensions:

- The operational dimension > refers to the skills that are necessary for the use of new information and communication technologies.
- The cultural dimension > involves stepping into the culture that supports the practice of using ICTs for educational purposes, regardless of one's level of expertise.
- The critical dimension > invites teachers and learners to step outside the culture and challenge assumptions that are embedded in the success stories about ICTs inside and outside of schools.

Therefore, e-schools will be characterized as institutions that have learners who utilize ICTs to enhance learning and access to ICT resources that support curriculum delivery and connections to ICT infrastructure.

Chasia (2002) supports the White Paper by saying that an e-school will be a school with a minimum set of ICT tools necessary to improve and accelerate the provision of education in Africa such as computers, radio, television, telephone, etc. He further states that every e-school will also have a health point, thus contributing to the objectives of the health program of NEPAD.

2.3.3.4: How ICT could contribute to e-Learning

De Villiers (2005) defines e-learning as an instruction delivered on a computer by way of Compact Disc-Read-only Memory (CD-ROM), Internet, or Intranet, which includes content relevant to the learning objectives, uses instructional methods such as examples and practices to help learning, uses elements such as words and pictures to build and deliver new knowledge, and skills linked to individual learning goals. E-learning activities should be provided to stimulate higher-order-thinking skills (HOTS).

He also traces the evolution of e-learning and describes characteristics that indicate underlying theoretical biases in traditional educational software, as well as in online courses and web-based instruction (WBI). He reviews the development of e-learning from the computer-aided instruction (CAI) system of the 1960s to the present, which is dominated by the pervasive worldwide web (www) and Internet.

The White Paper (2004) concurs with De Villiers (2005) when stating that ICT is a tool to develop education. E-learning is about learning and teaching philosophies and methodologies within the context of outcomes-based education (OBE) using ICTs in the learning environment. E-Learning will be introduced as an integral part of an environment where teaching is transformed and where learning is an ongoing, creative process.

Sachs (n.d.) cites as the White Paper in that schools must integrate ICT tools into their learning processes if they are to be part of the Networked World. He states that programs that give students access to information and communication technologies in the classroom provide an important step to improving readiness. Curricula must be redesigned to encourage the use of ICTs in the pursuit of problem solving, group learning and research.

Terry and De Freitas (n.d.) concur with De Villiers (2005) by saying that e-learning is learning by means of advanced technologies, such as the Internet, intranet, satellite broadcast, videotape, CD-ROM, etc. They state that e-learning can be used to describe a range of learning situations, including distance learning, web-based learning, virtual classrooms, etc.; what they all have in common is the use of information and communication technologies as a medium of learning.

Barabash *et al.* (2003) support De Villiers (2005), the White Paper (2004) and Sachs (n.d.) that the availability of information sources in the Internet environment is an important factor that affects process of teaching and learning in general. They further state that ICT can be regarded as a possible factor to make teaching and learning more diverse, efficient and meaningful

through the introduction of computer usage, Computer-Mediated Learning or Internet-Mediated learning in the learning environment.

Terry and De Freitas (n.d.) note that using technology to achieve better learning outcomes, or a more effective assessment for these outcomes, or a more cost-efficient way of bringing the learning environment to the learners, will improve learning. Therefore, e-learning will allow remote learners to interact with each other and with the representations of the subject matter in a form that could simply not be achieved for those learners without the technology.

Leidner and Jarvenpaa (1995) argue that to use information technology to improve learning processes, the pedagogical assumptions underlying the design of information technology for educational purpose must be understood. Furthermore ICT can be used to automate the information delivery function in classroom.

Ramcharan (2004) notes that communities would benefit from e-learning. The following are the main benefits of e-learning

- Employees can tap into a knowledge base from almost anywhere.
- This results in increased productivity since information can be accessed from the most remote areas. Workers or learners can engage in e-learning at any time—while commuting, traveling, or waiting in line.
- Field learning can become a great success. Employees can learn on the job, wherever and whenever the information is most useful.
- As soon as they learn something new, learners can add to their knowledge base right from the field.

Kurtus (2000) concurs with The White Paper (2004) and DeVilliers (2005) that e-Learning can be delivered through a CD-ROM, over the LAN,

or on the Internet. It includes Computer-Based Training (CBT), Electronic Performance Support System (EPSS) and Web-Based Training (WBT), as well as distance learning. E-learning is flexible learning using ICT resources, tools and applications, focusing on interaction among teachers, learners and the online environment, and on collaborative learning.

Rist and Hewer (1999) define Learning Technology (LT) as the application of ICT for the enhancement of teaching, learning and assessment. LT includes computer-based learning and multimedia materials and the use of networks and communication systems to support learning. LT clearly embraces a wide range of applications, some of which in the past have been classified under various acronyms such as CAI (Computer Aided Instruction), CAL (Computer Aided Learning, CBL (Computer Based Learning) and CBT (Computer Based Training)

Newer technologies have brought with them new acronyms like CAA (Computer Aided Assessment) and CMC (Computer Mediated Communications). An essential component in a LT package is one with which the learner can interact with the contents; this is referred to as the HCI (Human Computer Interface).

2.3.3.5: How ICT could contribute in developing e-Strategies in education

According to Chasia (2002) developing e-strategies is essential both to accelerate the extension of ICT infrastructure at an affordable cost and to promote the use of ICT for education, health, commerce, government and agriculture, amongst others. The New Partnership for Africa's Development (NEPAD) Commission is in discussion with the World Economic Forum (WEF) for support in developing e-strategies.

The White Paper (2004) states that the Department of Education must develop a national framework of competences for educators, managers and administrators. The use of ICTs must be integrated into pre-service and in-service training. Therefore, this will require creating appropriate accreditation

within the National Qualification Framework (NQF), revising the Norms and Standards for educators and reviewing department of education in-service training policies and programs to include ICTs when appropriate. Standards for professional competency in ICT utilization will consider the following levels:

- Entry - able to use computers and teach learners to use computers.
- Adoption - able to use various technologies to support teaching and learning.
- Adaptation - able to use technology to enrich the curriculum and use integrated systems for management and administration
- Appropriation - able to integrate technology into teaching and learning activities.

2.3.3.6: How ICT could contribute in creating e-Portfolios in Institutions

DiBiase (2002) defines a portfolio as the collection of evidence assembled by students, faculty members, or entire institutions to enhance the effectiveness of teaching and learning, to assess learning effectiveness, and to demonstrate competence to external stakeholders. DiBiase (2002) focuses more on student learning portfolios and teaching portfolios. Student learning portfolios are purposeful collections of examples of student work, ideally with the student's reflective commentary. Students may also assemble portfolios as a way to earn academic credits for learning accomplished outside the classroom. Teaching portfolios consist of course syllabi, assignments and student work, collected by practicing or aspiring teachers with the intent of fostering self-reflection and peer review of teaching.

According to DiBiase (2002) the potential benefits of e-portfolios have more to do with the process of e-portfolio development than with the portfo-

lio product itself. An e-portfolio development involves the following five stages:

- Collection - teachers and students learn to save artifacts that represent the successes in their day-to-day teaching and learning.
- Selection - teachers and learners review and evaluate the artifacts they have saved, and identify those that demonstrate achievement of specific standards.
- Reflection - teachers and learners become reflective practitioners, evaluating their own growth over time and their achievement of standards as well as the gaps in their development.
- Projection or Direction - teachers and learners compare their reflections to the standards and performance indicators and set learning goals for the future.
- Presentation - teachers and learners share their portfolios with their peers.

DiBiase (2002) also notes that the process of e-portfolio development encourages students to become more actively involved in planning, and more responsible for achieving their own educational goals.

2.3.3.7: Using ICT for assessment and record keeping at school level

The White Paper (2004) argues that assessment is an important driver in education and, if not well managed, can become a barrier to innovation. Once ICTs are embedded in learning and teaching processes, learners will want to be assured that assessment effectively tests the level of acquisition of skills and competences acquired through e-learning. The White Paper further states that e-learning will require teachers and learners to reflect upon and improve their approaches and strategies to teaching and learning. The efficient use of e-learning methodologies has the potential to enhance the quality and value of assessment.

The White Paper (2004) also states that the use of ICTs in assessment will enable teachers to use data analysis techniques to track learner achievements and review teaching strategies according to the insight gained. Therefore teachers will be able to give learners immediate feedback on progress, identify areas of weakness, and design necessary and appropriate support systems in a timely fashion.

The National Protocol on Assessment (2005) defines assessment as a process of collecting, synthesizing and interpreting information to assist teachers, parents, learners and other stakeholders in making decisions about the progress of learners.

Klopper and Lubbe (2005) state that for clear assessment schools should develop learning activities and provide learners and all stakeholders with the specified criteria and allocate marks for each activity. Learners and parents should know exactly what is expected from them for each question. Example:

Figure 2.1: Activity- the educator will divide learners into groups to develop a questionnaire to interview any exemplary person from their community about his/her career path.

Criteria	Level 1 (0-34%)	Level 2 (35-40%)	Level 3 (41-69%)	Level 4 (70-100%)	Marks	Total 20
Developing a questionnaire	Very little planning	Some attempt being made	Questionnaire has being developed	The Questionnaire is short and to the point	5	
Gathering information	No or irrelevant information	Some information available	Information available but not all	The info. About a person is clear	5	
Note taking during presentation	No notes have been taken	Sketchy notes have been taken	Key words have been taken	Detailed notes, nothing is omitted	5	
Cooperative skills	Hardly participate in all activities	Participate sometimes in all activities	Participate but there is room for improvement	Participate fully in activities.	5	
					20	

Figure 2.1: Questionnaire about your career path.

According to Mogey and Watt (1999) ICT can be used for assessment purposes at various levels ranging from the management of the assessment information to a fully automated assessment system. Using ICT for the management of assessment information can enable information to be presented in different ways to meet the needs of different audiences (such as national, provincial, regions, district, circuits, wards and schools. Assessment is performed to assess a person's achievements, potential, intelligence, attitudes and motivations. All forms of assessment provide estimates of the person's current status.

The National Protocol on Assessment for Schools (2005) defines recording as a process in which the teacher document the level of a learner's performance. Records of learner performance should provide evidence of the

learners' conceptual progression within a grade and his/her readiness to progress to the next grade. These records will be kept electronically or in hard copy and should be used to monitor learning and planning ahead. These results should be reported to the learners, teachers, parents, schools and other stakeholders such as the department, employers, tertiary institutions, etc.

Klopper and Lubbe (2005) support Mogey and Watt (1999) that the national department of education will be able to access these records of schools through provincial departments. Provinces will get it from the regions, and regions will receive it from circuits and circuits from schools.

Mogey and Helen (1999) concur with the National Protocol on Assessment for Schools (2005) which states that the most immediately obvious and most easily accessible use of technology to assist the assessment process is in the recording, analysis, general storage and management of results. Results from several assessments, courses or modules can be collated quickly, easily and accurately for discussion at examination boards, and the volume of paper required for long-term storage can be dramatically reduced through the use of ICT.

Ramcharan (2004) states that it is important that learner details be accurately stored to ensure speedy availability when the need arises. Information needs to be updated on an ongoing basis. Such storage of information serves as a useful link between parents and the school as well as between the school and the department of education. A well-planned information network will adequately capture relevant data about most aspects within the school.

2.4: Synthesis of literature pertaining to theory, research methodology and prior research

In the following three sections, syntheses will be presented of the reviewed literature pertaining to the research method utilized to constrain the interpretation of the empirical research undertaken in this study, and the most appropriate research methodology to be employed, as the results of other research may necessitate the reformulation of the interim problem statement,

research objectives and research questions that were presented in the first chapter.

2.4.1: Synthesis of literature pertaining to the theoretical framework that was used in this dissertation

The researcher decided to use e-readiness as the theoretical framework for this dissertation because e-readiness assessments are the first phase and foundation for strategy and action plans (Bridges.org, 2005). According to McConnell International (2000/1) e-readiness will help countries to find out whether they are ready, if they are taking any action or are working towards paving the way for Information and Communication Technology (ICT) to be introduced. McConnell International (2000/1) use five interrelated components to assess the current state of e-readiness for each country. The researcher draws the conclusion from the literature survey that these e-readiness rankings appropriately assess the quality of infrastructure for each country as well as the strength of its economy, political stability and policy environment.

The Economist Intelligence Unit (2005) also assessed the e-readiness of the world's largest countries on their ability to promote and support information and communication technology services. It is important that a comprehensive look at e-readiness combines assessment of the society and economy. Therefore, ICT can only be introduced successfully if South Africa is ready for it. If the socio-economic issues are not studied and addressed, the practical use of ICT will not be impossible. If these issues are indeed addressed, the community at large will benefit because digital technology offers potentially wonderful benefits for people all over the world such as distance learning, economic development, greater health care availability, broader availability of goods and services from business and government, improved productivity, building human capital and greater citizen empowerment.

2.4.2: Summary of literature pertaining to the research methodology

The researcher reviewed the following completed dissertations: Rugbeer (2005), *A Conceptual Framework for Implementation E-Education in KwaZulu-Natal*; Govindsamy (2002), *Modeling Optimal Communication for the School as an Organization*; Hiralal (2005), *Dominance and Submission, How peer groups in South African Secondary Schools construct and utilize peer networks*; Ramcharan (2004), *Managing Human Resources in Education*. These dissertations were considered useful as their research methodologies consist of a literature survey, followed by research among learners, teachers and management at public schools in the greater Durban Region. They also use the quantitative research methodology, which was used to analyze the responses from respondents in the present study. They all used the SPSS to quantify results.

According to Leedy and Ormrod (2005) the research design provides the overall structure for the procedures the research follows, the data the researcher collects and the data analysis the researcher conducts. The methodology to be used for a particular research problem must always take into account the nature of the data that will be collected in the resolution of the problem. The data dictate the research method.

This research consisted of the Field Study Research Approach. According to Klopper and Lubbe (2004) field study research is the type of research in which data are gathered directly from individuals in their natural environment for studying interactions, attitudes or characteristics of individuals

The research was conducted in two phases: Firstly, a literature survey of existing studies on how public school learners in KwaZulu-Natal urban communities perceive e-education was conducted.

Secondly, a survey among a representative sample of urban high school learners to determine the perceptions and conceptions about e-education among learners in KZN public schools, was conducted. The second part of this study therefore is of a quantitative analytic nature, entailing a research methodology based on fieldwork during which the researcher personally su-

pervised the completion of questionnaires by the respondents on their school premises. The responses were analyzed by means of the SPSS version 13.

2.5: Status of interim problem statement, research objectives and research questions

An initial stage Nexus search was undertaken in 2004 to determine the nature and extent of research in South Africa regarding perceptions and conceptions of learners about e-education. The search revealed that at the time there was no ongoing or completed research being undertaken. In 2005 the search revealed that some research was in progress on e-education in KwaZulu-Natal. In February 2006 the search revealed that there was no completed research as yet, and the latest search which was conducted in October 2006, yielded the same results. These facts were taken into consideration and the research problems for this study were formulated.

The survey of prior research revealed that no solutions to the problems identified in chapter one has as yet been found. The problem-set, which is identified in the first chapter, was therefore retained to determine what references should be surveyed.

2.6: Conclusion

In this chapter the researcher outlined the various sources of information that were utilized to gather information on the topic being researched. The University of KwaZulu-Natal libraries were consulted using different search engines to get information relevant to the topic. A concept matrix was used to provide a more detailed literature study on the topic being researched. A synthesis based on the reviewed literature pertaining to the research method, the most appropriate research methodology and the status of the interim problem statement, research objectives and research questions, was presented.

In the next chapter the researcher will give an account of the research methodology that was employed to solve the problems that were identified in the first two chapters.

Chapter 3

Research Methodology

3.1: Introduction

In this chapter an account of the research methodology that was utilized to conduct the research, is presented. This includes a discussion of the field work that was conducted, the construction of the questionnaire and the processing of the data.

3.2: Permission to Conduct the Survey

Permission to undertake the survey was obtained from the relevant authorities (The Research Strategy, Policy Development and EMIS Directorate). The researcher submitted letters of approval to the principals of the selected schools and consent was obtained. The data was collected using face-to-face filling in of the instrument. The instrument used was a questionnaire developed by the researcher and her supervisor.

3.3: Dissemination of Questionnaires

A sample of six secondary schools that were randomly selected by the supervisor and the fellow researchers without any knowledge of learners' perceptions and conceptions about e-education was used. The researcher delivered the questionnaires personally to the selected schools over a period of six days. Each school was given one day to complete the questionnaires, which were collected by the researcher. The researcher was always present at all six schools where she personally supervised the filling in of the questionnaire with the approval of the School Management Teams (SMT) of the selected schools. Personal supervision of the respondents by the researcher assisted in the accurate completion and prompt collection of the 800 questionnaires.

3.4: The Research Instrument

The questionnaire was designed to obtain relevant data from public school learners in KwaZulu-Natal (KZN) urban communities about their perceptions and conceptions towards e-education. The questionnaire focused on Grade 9 and 11 learners. The respondents were informed that their responses would remain confidential. The respondents were further informed that their participation in the survey was voluntary, but their assistance would be appreciated and their participation was needed. The researcher decided to use Grade 9 and 11 because she needed to get different responses from different age groups. Grade 9 and 11 are settled in their phases. Grade 9s are at the exit point of the GET Phase and Grade 11s are at the second year of the FET Phase. The researcher did think of Grade 8 and 10 but she foresees the problem of overexcitement or withdrawn, because they are new in their phases. The researcher realized that the Department of Education would not allow her to disturb Grade 12s.

3.5: Representativeness of the Research Sample

The Provincial Education Management Information Services (EMIS) report that there are 56 urban schools in the Umlazi Circuit. According to Leedy and Ormrod (2005), random selection means choosing a sample in such a way that each member of the population has an equal chance of being selected. Therefore, when such a random sample is selected, the researcher can assume that the characteristics of the sample approximate the characteristics of the total population. Leedy and Ormrod (2005) point out that if the researcher needs to identify a sufficient sample size, the researcher should follow the basic rule, which is, the larger the sample the better. They also state that if the population size is beyond a certain point (about 5,000 people or more) the population size is irrelevant, and a sample size of 400 should be adequate. Therefore the researcher needed 400 respondents in order to have a sufficient sample that would allow the researcher to extrapolate the results to all urban secondary schools in the Ethekewini region. This implies that the re-

sults could be extrapolated to all learners in urban secondary schools in the greater Ethekekwini region.

3.6: The Questionnaire

Because the research for this dissertation forms part of a more comprehensive, coordinated research project on the introduction of e-education in KZN public schools, the participating researchers developed the questionnaire in conjunction with the supervisor to be used by each of the researchers. Subsequent to the completion of formal dissertation studies, the researchers could then do a comprehensive analysis of e-education in KZN public schools, based on the integration of five individual databases into a comprehensive database. The questionnaire was formulated to present the perspectives of learners in Grade 9 and 11, and educators in KZN public schools. The questionnaire is included as addendum 2 in chapter 5.

3.6.1: The Questionnaire Heading

The heading was designed so that the cover page creates a professional look and evokes an eagerness to complete the questionnaire. Details of the researcher, the supervisor the University of KwaZulu-Natal, are prominently displayed to lend credibility to the research.

3.6.1: Note to the learner

Under this heading an appeal is made to the learner participants to assist in completing the questionnaire, stressing that participation was on a voluntary basis and that the particulars of individual participants would be treated in the strictest confidentiality.

A brief explanation informs the participants of what they would encounter in the five different sections of the questionnaire. A number of directives are given on how to complete the questionnaire.

3.6.2: Questionnaire subsections

The following five subsections were included to collect specific information. From the five subsections of the questionnaire the researcher will use part 2, 3, 4 and 5 to answer the five key research questions of this dissertation.

Part One

The participants, personal particulars, as general information to help with the solutions to the problems identified, are requested in this section.

Part Two

In this section the researcher wanted to find out how frequently the respondents use electronic communication instruments at home.

Part Three

In this section the researcher wanted to find out how often the respondents use computer software programs at home.

Part Four

In this section the researcher wanted to find out whether certain computer programs are used at their schools.

Part Five

In this section the researcher wanted to find out whether schools have any of a number of e-learning facilities.

3.7: Fieldwork

In this section the researcher outlined the method to be employed in conducting fieldwork among the learners of selected urban public secondary schools in the Ethekwini region. The researcher explained the rationale behind the construction of the questionnaire, by describing how the researcher gained access to respondents at particular schools.

The researcher personally delivered the questionnaires to the selected schools over a period of six days. Each school was given one day to fill in the

questionnaire. The researcher was always present to help the respondents in filling in of the questionnaire. Questionnaires were collected on the same day by the researcher in each school. Therefore, all 800 questionnaires were returned.

3.7. 1: Data processing from questionnaire to data tables

In this section the researcher provided information regarding the SPSS 13 database program. The researcher explains how the codes for analyzing the results of the survey were set up and how the actual results for each respondent were coded: once parameters are set in the variable mode, the necessary headings and columns are generated in the data view. This is where data is entered. In the data mode, shorthand codes e.g. “perm” for “permission”, “ethn” for “ethnic group” etc. are used as column headings. These headings appear as labels in graphs and tables.

During the distribution of questionnaires each respondent was required to read the questions in the questionnaire and mark their responses by placing a tick or a cross in the appropriate spaces, or by writing down the appropriate information where required. The responses were then entered into the SPSS 13.

3.7.2: Rows, Columns and Cells

SPSS 13 is a statistical analysis database organized in vertical columns and horizontal rows. Each column contains the data for a particular question in the questionnaire. Each row contains the total number of responses of a particular respondent. The rows and columns attribute what the researcher has been testing for. The point where a row and column intercepts is identified as a cell. Data is entered in a cell. The data for each respondent is entered one cell at a time proceeding from left to right. Each cell in the respondent row contains the respondent’s particular response to the attribute that is being tested in that particular column of the database.

3.7.3: Types of measurements used

Scalar, Ordinal and Nominal measurements are the three types of measurements used in quantitative research. The type of measurement will dictate the statistical procedures that will be used in processing the data and achieve inferential analysis. Measurements are quantified so that means, modes and medians can be determined. The types of measurements are:

- **Scalar Measurement** – appropriate when respondents express attitudes and opinions etc. measured on a gradually changing continuous scale such as Excellent – Good –Bad – Very Bad.
- **Ordinal Measurement** – where various sections of data are brought together and ranked in either higher or lower values to each other.
- **Nominal Measurement** – according to Leedy and Ormrod (2002) when nominal measurement is used, data is usually restricted or limited. Nominal measurement is appropriate when measuring gender; that is, male or female.

3.7.4: Verifying the accuracy of the coding process

The researcher verified the accuracy of the encoding process by double-checking each code entered after the questionnaire had been encoded onto the database. The researcher carefully looked at each respondent's responses to establish whether they were constructively involved in filling in the questionnaire. She looked for respondents with a high degree of "no response" or "spoilt response". As all the questionnaires had been completed as required, there was no need for the researcher to remove any questionnaire from the data base. The idea behind checking such information is to ensure that the results are credible and not skewed by respondents who are not fully and constructively involved in answering questions. The total number of 800 active respondents could thus be used in the survey.

3.8: Conclusion

In this chapter the researcher outlined the research methodology that was employed to conduct the survey by explaining how permission to conduct the survey was obtained and how the questionnaire was constructed. The researcher also explained the SPSS and how it was implemented to capture the data received by means of the questionnaires. In the next chapter the researcher will report and interpret the results that were obtained using the SPSS 13.

Chapter 4

Data Analysis

4.1: Introduction

In this chapter the researcher will present the results of the survey. The data received are analyzed to determine the usage and availability level of electronic communication devices at the homes and schools of KZN public school learners. Findings are presented through the use of graphs and tables extracted from the SPSS 13, in each instance followed by short interpretation of the significance of the results. Significant tables and graphs demonstrating some of the researcher's findings can be found in Addendum4 chapter 5. The statistical tests that will be presented in part 2, 3, 4 and 5 of the questionnaire would be used to answer the key research questions regarding the e-readiness of the urban public school learners. The statistical tests that will be presented in Figure 4.7 to Figure 4.17 will be used to answer the key research questions 2, 4 and 5. Figure 4.18 to Figure 4.22 will be used to answer the key research questions 1 and 3.

4.2: Demographic characterization of the respondents

In the following section the researcher will give a general demographic characterization of the respondents that participated in this study, that is grade 9 and 11 high school learners in the Umlazi Circuit of KZN.

4.2.1: General personal particulars of the respondents

From figure 4.2 it is clear that the learners did not feel intimidated and were not suspicious of the nature of the research that was conducted in their school. This could be inferred from the fact that the overwhelming majority of the respondents, 99% (798), provided their full personal particulars. Less than half a percent .3% (2) of the respondents partially completed the questionnaire.

		Count	Col %
permission to use	complete	798	99.8%
responses	partial	2	.3%
Total		800	100.0%

Figure 4.2: Rate at which learners supplied their personal particulars

Out of 800 respondents only 2 did not give their full details and 798 respondents supplied their particulars fully. This could be interpreted as a high level of self-confidence and trust in the survey.

4.2.2: Age of the respondents

Figure 4.3 represents the age of the respondents who participated in the survey. A large percentage of about 98% (780) learners are adolescents and only about 3% (20) are young adults at the exit (grade 9) of the GET phase and towards the exit (grade 11) of the FET phase.

		Count	Col %
age	adolescent	780	97.5%
	young adult	20	2.5%
Total		800	100.0%

Figure 4.3: The age group of the respondents

The uneven distribution among adolescents and young adults in the sample leads the researcher to conclude that age difference cannot be consid-

ered as the reason for differences among the respondents about their perceptions and conceptions regarding the implementation of e-education.

4.2.3: Gender of the respondents

Figure 4.4 reveals that out of 800 respondents, 49% (388) were females and 51% (409) were males. There were almost equal representations of females and males in this sample, with only 2% fewer female respondents than male respondents. The graph also shows that there were only .4% (3) spoilt responses in gender data on the questionnaires.

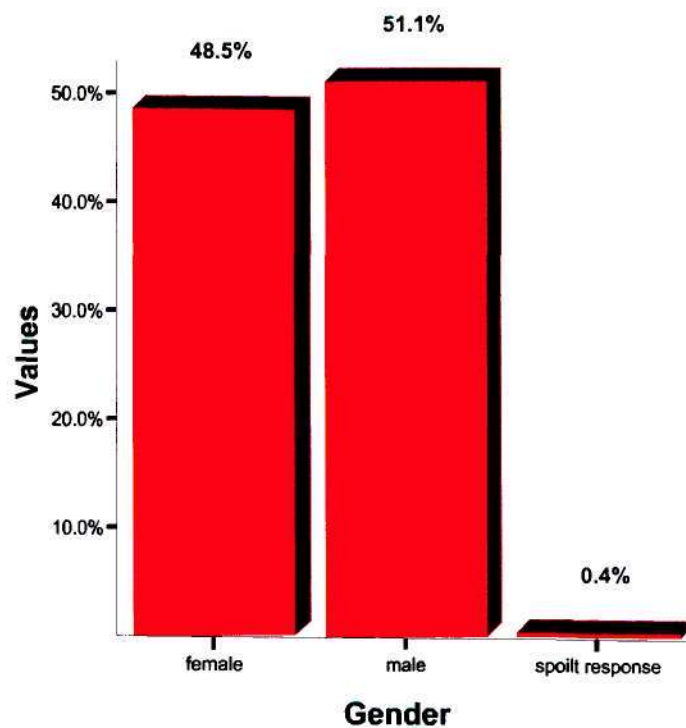


Figure 4.4: Gender of the respondents

The even distribution between females and males indicates that gender could be a good explanation for differences among respondents if one were to encounter variation of opinions expressed about any particular matter.

4.2.4: The rank of the learners

Figure 4.5 shows the grade level of the respondents. About 53% (427) of the respondents are doing grade 9, and just over 46% (373) of the respondents are doing grade 11. There were no spoilt responses for this question.

		Count	Col %
your rank as an educator/ learner	grade 9 learner	427	53.4%
	grade 11 learner	373	46.6%
Total		800	100.0%

Figure 4.5: Rank of the learners

The balance of the respondents in different grades (9 and 11) could be used as the factor to measure the exposure of learners to the electronic communication devices according to their grades in Zulu urban schools in the Umlazi District.

4.2.5: The area where the respondents live

Figure 4.6 show that a large percentage of learners, 99% (793) live in an urban area. A half percent .5% (4) of learners lives in rural areas. Less than half percent .3% (2) of the responses was spoilt and only .1% (1) respondent decided not to respond in this regard.

		Count	Col %
the area where you live	rural	4	.5%
	urban	793	99.1%
	spoilt response	2	.3%
	no response	1	.1%
Total		800	100.0%

Figure 4.6: The area of the respondents

The statistics above reveals that almost all the respondents live in urban areas. This will help the researcher to find out about the usage and availability level of electronic communication devices by the respondents at home and schools.

4.3: Use of electronic communication devices

In this section the researcher will use tables and graphs to demonstrate how frequently the learners (grade 9 and 11) in urban high schools at Umlazi District use electronic communication instruments at home and at school.

4.3.1: How frequently do the respondents use an ordinary telephone at home?

Figure 4.7 reveals that about 72% of the respondents do not have telephones at home, 10% use a telephone daily, 14% use a telephone sometimes, and 1% never uses it; 2% who spoil their responses.

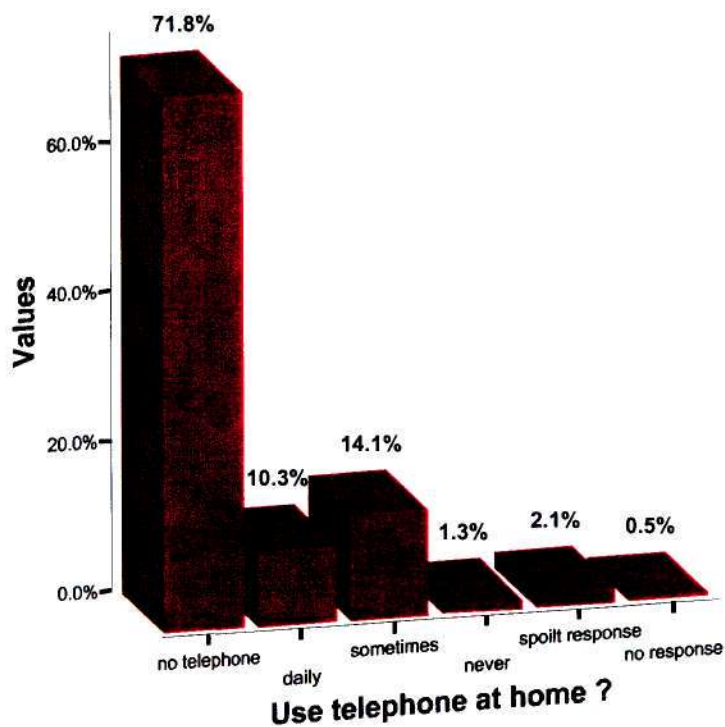


Figure 4.7: How frequently do they use telephone at home?

The results in the graph above reveals that very few Zulus living in urban communities use landline telephones as their means of communication. The majority of the respondents do not have landline telephones at home.

4.3.2: How frequently do the respondents use the radio at home?

From the statistics given in figure 4.8 below, it is clear that very few, about 12% (92) of the respondents, do not have radios, 65% (522) of the respondents use radios daily, about 20% (164) do have radios but they do not use them daily. A half percent .5% (4) do have radios but never use them. Only 2% (16) of the responses were spoilt and (2) respondents decided not to respond in this regard.

		Count	Col %
how frequently do you use the radio?	no radio	92	11.5%
	daily	522	65.3%
	sometimes	164	20.5%
	never	4	.5%
	spoilt response	16	2.0%
	no response	2	.3%
Total		800	100.0%

Figure 4.8: How frequently do they use radio at home?

It can be concluded that a large percentage of respondents use radios because the majority of their homes do have them.

4.3.3: How frequently do the respondents use TV at home?

The bar graph below (Figure 4.9) represents the use of TV by the respondents at home. About 15% (127) of the respondents do not have television. A large percentage of respondents do have television and they use them daily, while 20% (160) respondents do have television but they use it sometimes and not daily. Only less than half percent .4% (3) have television but never use it. About 2% (17) responses were spoilt and less than half percent .3% (2) did not respond.

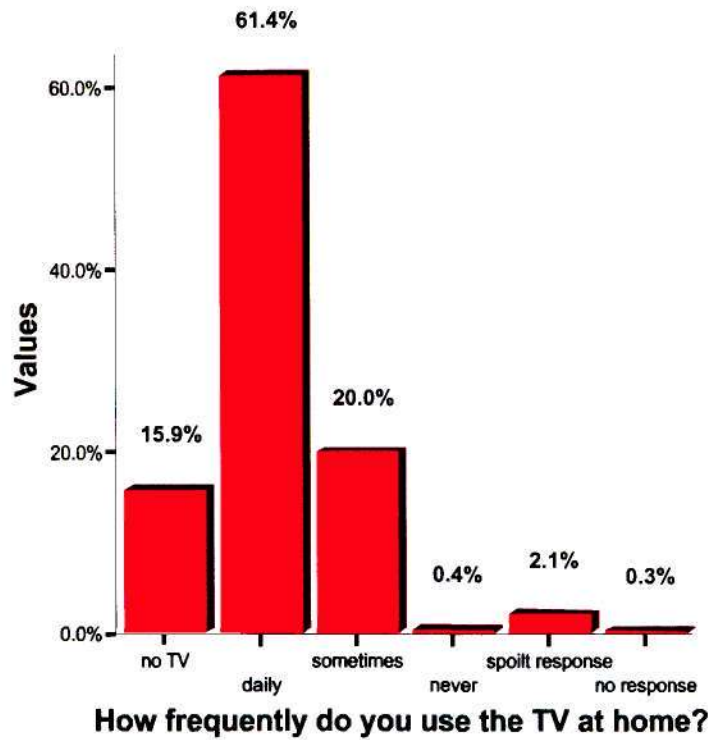


Figure 4.9: How frequently do they use TV at home?

The statistics in the graph above shows that a large percentage of respondents use television a lot because they do have them.

4.3.4: How frequently do the respondents use a VCR or DVD at home?

The table below (Figure 4.10) shows that above 56% (453) of the respondents do not have VCR or DVD at home. About 13% (106) of the respondents do have them and they use them daily, 27% (217) do have them but they use them sometimes, while 2% (12) of the respondents have them but do not use them. Only 1% (10) spoil their responses and less than half percent decided not to respond.

		Count	Col %
how frequently do you watch videos?	no vcr/dvd	453	56.6%
	daily	106	13.3%
	sometimes	217	27.1%
	never	12	1.5%
	spoilt response	10	1.3%
	no response	2	.3%
Total		800	100.0%

Figure 4.10: How frequently do they use VCR or DVD at home?

The above statistics reveals that more than half of the respondents do not have VCR or DVD and close to half do have the VCR or DVD. This means that there is a balance between the haves and have nots.

4.3.5: How many computers/laptops at your home?

Figure 4.11 below illustrates that a large percentage, 93% (746) of the respondents do not have computers or laptops at home. Just above 5% (47) have one computer or laptop at home and only (1) have two computers or laptops at home. All respondents responded and only .8% (6) responses were spoilt.

		Count	Col %
how many computers are there at your home (including laptops)?	none	746	93.3%
	1	47	5.9%
	2	1	.1%
	spoilt response	6	.8%
Total		800	100.0%

Figure 4.11: How many computers/laptops at your home?

The above table reveals that the majority of township communities do not own or have personal computers or laptops. Out of 800 respondents only 48 respondents indicated that they do have computers and laptops at home.

4.3.6: How often the respondents use word-processing for school-work at home?

The graph below (Figure 4.12) reveals that a large percentage of respondents, about 93% (748) out of (800), do not have computers in their homes. Only 1% (12) of the total number of respondents spend an hour doing their schoolwork using a computer in their homes, and 1% (13) spend less than an hour doing their schoolwork using a computer, and 2% (18) never use computers for their schoolwork. Only less than one percent .9% (7) respondents spoil their responses. These statistics also reveal that there is a shortage of computers at respondents' homes.

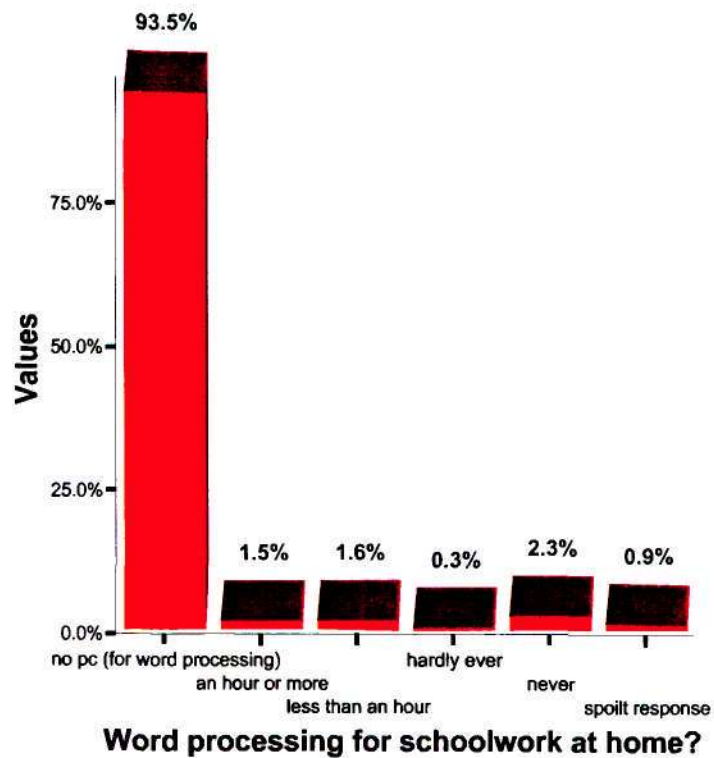


Figure 4.12: How often do they use word-processing for schoolwork at home?

The above table reveals that the majority of Zulu urban communities especially in townships do not have computers or laptops in their homes.

4.3.7: How often the respondents use word-processing at school?

Figure 4.13 shows that about 25% (203) respondents do not have computers in their schools. Just above 8% (71) do have computers and they have access to the computers. Only 4% (34) of the respondents are not allowed to use computers in their schools, while 55% (445) of the respondents are not sure whether these programs are used or not because they are not computer literate. Only 5% (46) spoilt their responses and 0% (1) did not respond.

		Count	Col %
is word processing software used at your school?	no pc's at my school	203	25.4%
	yes	71	8.9%
	no	34	4.3%
	i'm not sure	445	55.6%
	spoilt response	46	5.8%
	no response	1	.1%
Total		800	100.0%

Figure 4.13: How often do they use word-processing at school?

This table shows that schools are not ready for the implementation of e-education because the majority of the respondents, about (445), are not familiar with the terminology used concerning computers and a quarter of schools do not have computers.

4.4: Electronic learning facilities at schools

In this section the researcher used tables and graphs to identify whether schools in KwaZulu-Natal urban settings in the Umlazi District have any or enough electronic learning facilities.

4.4.1: Do you have multimedia devices at your school?

As Figure 4.14 reveals, out of 800 respondents 39% (311) do not have any of the mentioned multimedia devices in their schools and 37% (301) do have some multimedia devices.. Just 8% (71) of the respondents were not

sure whether they do have them or not. About 3% (31) responses were spoilt and less than half percent .4% (3) did not respond.

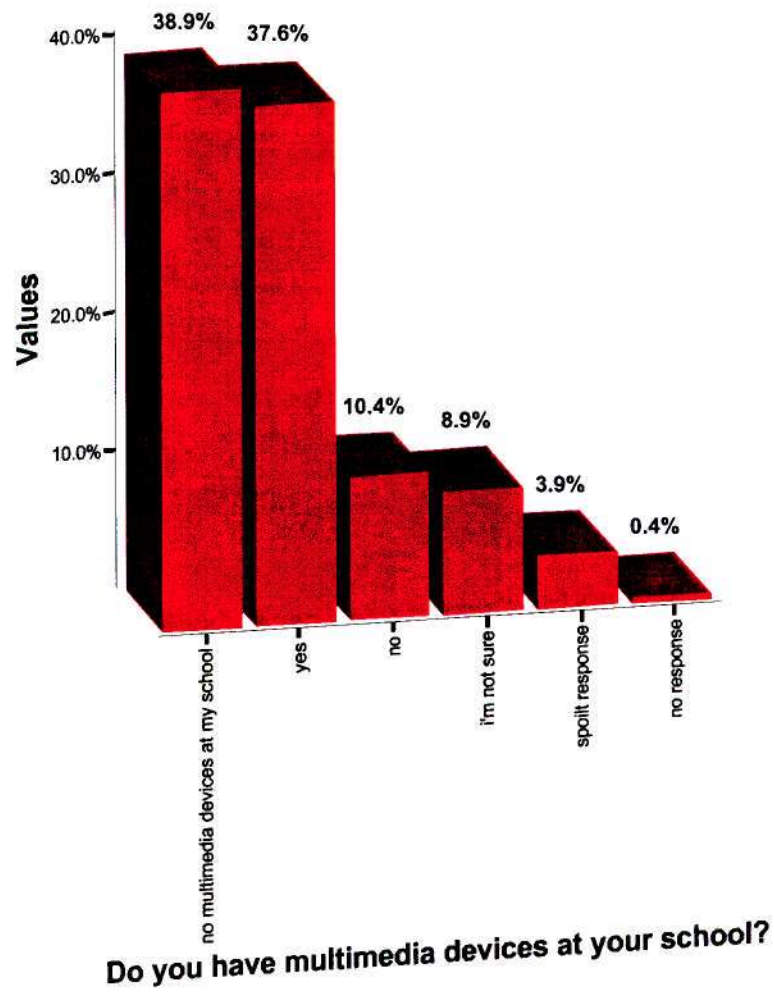


Figure 4.14: Do you have multimedia devices at school?

There were almost equal representation of those who do not have and those who do have multimedia devices, this indicates that some of the electronic devices are available in schools but educators do not use them as teacher support material.

4.4.2: Do you have freestanding computers at your school?

Figure 4.15 illustrates that more than half, 62% (498), of the respondents do not have freestanding computers in their schools. Out of 800 respondents, only 8% (67) do have freestanding computers, 13% (102) respondents do not have computers at all, and 14% (114) of the respondents are not sure whether their computers are freestanding or not. Only 2% (18) of the responses were spoilt, while close to zero .1% (1) did not respond.

		Count	Col %
do you have any free standing computers at your school?	no freesstanding computers at my school	498	62.3%
	yes	67	8.4%
	no	102	12.8%
	i'm not sure	114	14.3%
	spoilt response	18	2.3%
	no response	1	.1%
Total		800	100.0%

Figure 4.15: Do you have any freestanding computer at your school?

One can draw the conclusion from this table that schools do not have e-learning support material for e-education to be implemented successfully.

4.4.3: Do you have networked computers in your school?

Figure 4.16 indicates that a large percentage, of respondents, of about 54% (433), do not have these computers in their schools. Very few respondents, about 8% (65), do have these computers, 9% (75) do not have them, and about 27% (218) respondents are not sure whether their computers are linked or not. Only 1% (9) responses were spoilt.

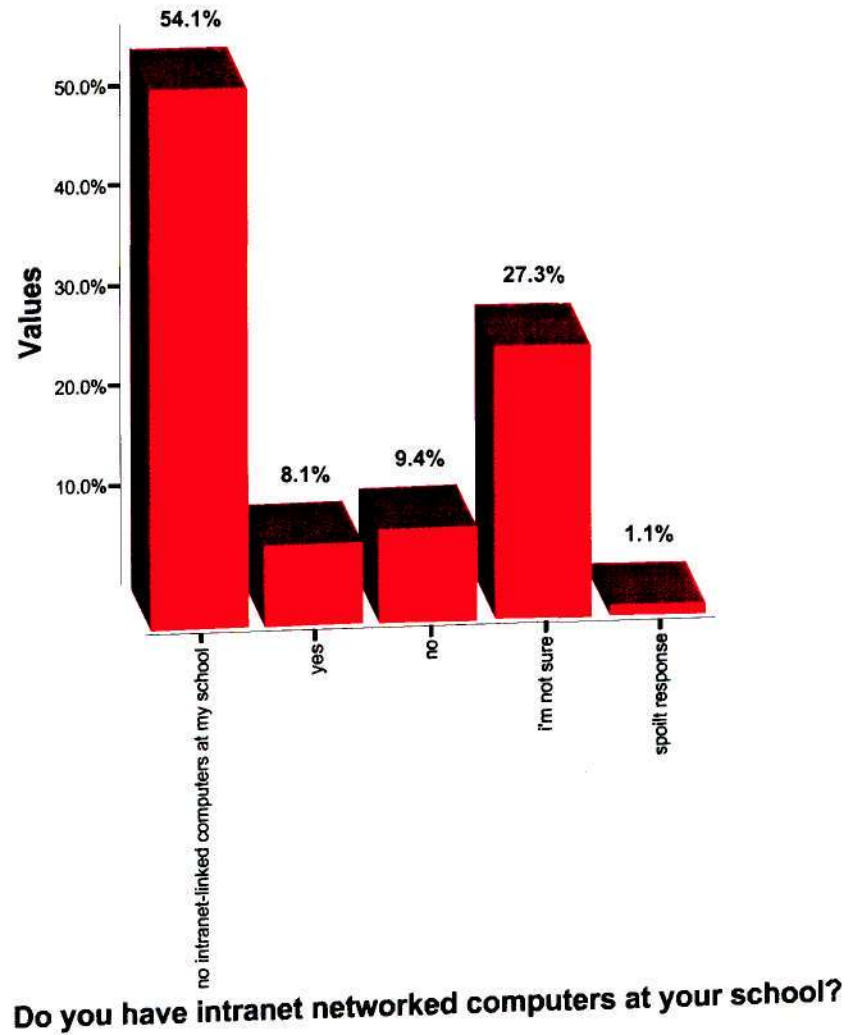


Figure 4.16: Do you have intranet linked computers at your school?

The graph reveals that there is a lot that needs to be done for the schools to be equipped so as to be ready for the introduction of e-education in 2013 in KwaZulu-Natal.

4.4.4: Do you have Internet linked computers in your school?

Figure 4.17 shows that a large percentage, about 49% (392) respondents, do not have these computers in their schools, 10% (81) respondents have such computers, while 7% (63) respondents do not have them at all. 31% (253) of them were not sure whether they do have these computers or not. Less than one percent .9% (7) of the responses were spoilt and less than half percent .5% (4) submitted no responses to this question.

		Count	Col %
do you have networked computers linked to the internet?	no internet-linked computers at my school	392	49.0%
	yes	81	10.1%
	no	63	7.9%
	i'm not sure	253	31.6%
	spoilt response	7	.9%
	no response	4	.5%
Total		800	100.0%

Figure 4.17: Do you have computers linked to the Internet?

The findings for question 4.4.1 to 4.4.4 indicated that there is a lot that needs to be done in uplifting of schools to meet the demands of e-learning after the introduction of e-education.

4.5: Perceptions about the use of Information Communication Technology in educational settings

In this section the researcher used graphs and tables to indicate the perceptions and conceptions of learners in KwaZulu-Natal urban areas about the use of information communication technology in educational settings.

4.5.1: How would you feel if you could cooperate with learners at overseas schools?

The graph reveals that the majority of the respondents, 80% (647) would like to cooperate with overseas learners, 17% (138) would feel good

about it, .3% (2) would feel bad about it and .8% (6) very bad. Close to zero .1% (1) of responses were spoilt, while .8%(6) did not respond.

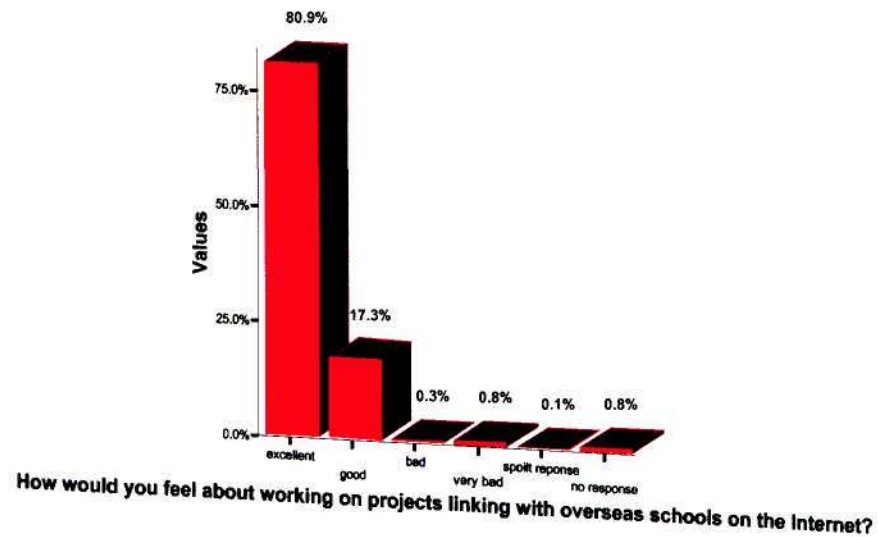


Figure 4.18: If you could work on projects linking with overseas learners, how would you feel?

The results indicate that learners would welcome opportunities to cooperate with overseas schools, but that the facilities are not available.

4.5.2: If you could use a direct two-way link to take part in live debates with other schools, how would you feel?

Figure 4.19 reveals that the majority, 81% (650), of respondents, feel that this would be an excellent idea, 14% (119) feel good about it, 1% (14) feel bad about it and about 1% (8) feel very bad..3% (2) spoilt responses were received and .9% (7) did not respond.

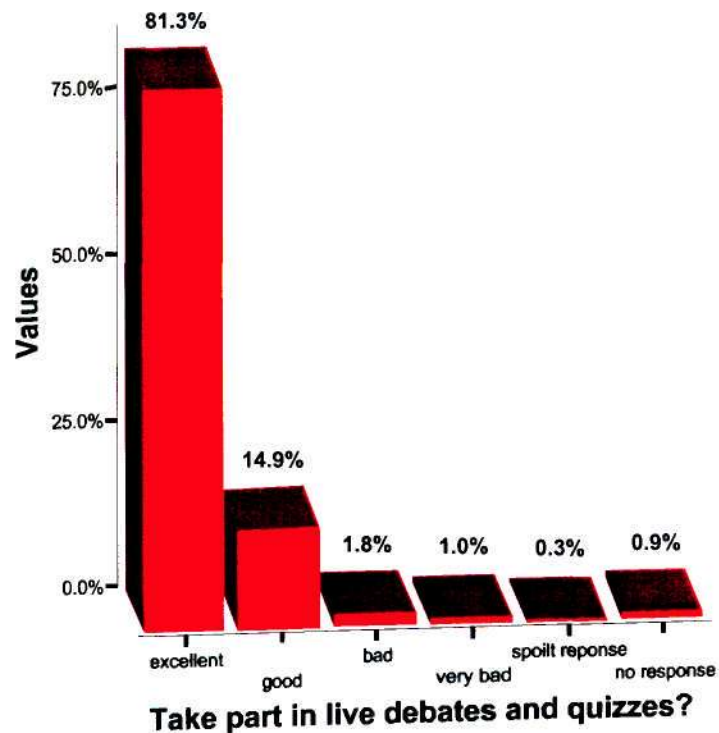


Figure 4.19: Two-way TV link to take part in debates and quizzes: how would you feel?

These results show that more than 90% of learners would welcome the opportunity to interact with other schools abroad. Again, learners are ready but the infrastructure is not on place for them to be involved.

4.5.3: How would you feel about the use of computers in doing exercises during free periods?

The results in Figure 4.20 show that 83% (671) of learners would like to work on their own using information communication and technology doing their schoolwork, 13% (111) would feel good about a chance to do things on their own electronic devices, less than one percent .8% (6) and .4% (3) said

they would feel bad and very bad. Only .5% (4) of responses were spoilt and .5% (4) decided not to respond.

		Count	Col %
how would you feel	learner - excellent	671	83.9%
about the use of	learner - good	111	13.9%
computers in	learner - bad	6	.8%
doing/setting	learner - very bad	3	.4%
exercises in subjects	educator - excellent	1	.1%
during free periods?	spoilt response	4	.5%
	no reponse	4	.5%
Total		800	100.0%

Figure 4.20: Use computers in doing exercises during free periods, how would you feel?

The overwhelming majority of the respondents indicated that learners would like to work on their own using information communication and technology doing their schoolwork as it would widen their scope of learning.

4.5.4: How would you feel if computer science/studies were available as a Matric subject?

The findings in Figure 4.21 indicate that 85% (686) of the respondents feel that subjects like Computer Applications Technology are needed in schools and agree that it should be available as a Matric subject. About 4% (33) respondents support the idea of having these Matric subjects, while 9% (73) and .1% (1) indicated that they will feel bad and very bad if these subjects were to be introduced.

		Count	Col %
would you	learner - excellent	686	85.8%
select/recommend	learner - good	33	4.1%
computer	learner - bad	73	9.1%
science/computer studies	learner - very bad	1	.1%
as a matric subject?	educator - bad	4	.5%
	educator - very bad	3	.4%
Total		800	100.0%

Figure 4.21: If computer science/studies could be available in matric?

The above results indicated that the majority of learners feel that computer science and computer studies are much needed in their schools due to pressure from the outside world. They also feel that these subjects are needed up to Matric level for them to become qualified and competent in the challenging world of technology.

4.5.5: Do you think that the electronic technologies would help or hinder the learning process?

The statistics given in Figure 4.22 indicate that electronic communication technologies would be of assistance in the learning process, because a large percentage of 89% (717) respondents feel that if these technologies can be made available and used, their learning will be successful. 4% (32) feel that their learning will be disturbed, and they may not be successful. About 6% (49) respondents are not sure whether they need such technologies or not. Only .1% (1) of respondents were spoilt and .1 (1) decided not to respond.

		Count	Col %
do you think that the electronic technologies mentioned in questions 73-75 would help or hinder the learning process?	help	717	89.7%
	hinder	32	4.0%
	i'm not sure	49	6.1%
	spolit response	1	.1%
Total		799	100.0%

Figure 4.22: Electronic technologies would help or hinder the learning process?

The statistics given in the table above reveal that electronic communication technologies are not available in schools because large percentages, 89% (717) respondents, feel that if these technologies can be made available, their learning would be successful.

4.6: Correlation between demographic factors, application factors and perceptual factors

According to Leedy and Ormrod (2002) correlation analysis examines the extent to which differences in one characteristic, or differences in one or more other characteristics or variables. A correlation exists if, when one variable increases, another variable either increases or decreases in a somewhat predictable fashion. In correlation studies, researchers gather data about two or more characteristics for a particular group of people or other appropriate units of study.

In this section the researcher will use tables only to do correlation between demographic factors, application factors and perceptual factors.

4.6.1: Working on projects linked with overseas schools on the intranet

Table 4.23 below shows that that learners overwhelmingly approve of the possibility of working on projects with other learners from schools abroad. Almost 81% of the learners thought it is an excellent idea. A further 17% considered it a good idea. Just over 1% thought it was a bad or a very bad idea. The table further reveals that there is no significant difference in perceptions between gender groups towards the above statement, with females constituting almost 41% of the total group approving of combined on-line inter-school projects and males constituting a very similar percentage of almost 40% of the total group of more than 80% approving of such activities.

161: how would you feel about working on projects and linking with other overseas schools on the intranet? * gender

		gender			Total
		female	male	spoilt response	
Q61: how would you feel about working on projects and linking with other overseas schools on the intranet?	excellent	40.9%	39.9%	.1%	80.9%
	good	7.1%	9.9%	.3%	17.3%
	bad		.3%		.3%
	very bad	.1%	.6%		.8%
	spoilt reponse		.1%		.1%
	no response	.4%	.4%		.8%
Total		48.5%	51.1%	.4%	100.0%

Figure 4.23: Projects in collaboration with overseas schools?

4.6.2: Use electronic libraries on the Internet to read electronic books

Figure 4.24 shows the learners' perceptions about accessing digital libraries online. Almost 87% of them thought it is an excellent idea, and a further 11% that it is a good idea. In contrast with such overwhelming support for accessing online digital libraries, with less than 1% thinking is a bad or a very bad idea. This table also show that there are no differences in perception among female (44%) and male (42.3%) learners about the prospect of using online digital libraries.

Q64: how would you feel if you could use electronic libraries on the internet to read electronic books? * gender

% of Total

		gender			Total
		female	male	spoilt response	
Q64: how would you feel if you could use electronic libraries on the internet to read electronic books?	excellent	44.0%	42.3%	.3%	86.5%
	good	3.9%	7.3%	.1%	11.3%
	bad	.3%	.1%		.4%
	very bad	.1%	.3%		.4%
	spoilt reponse		1.1%		1.1%
	no response	.3%	.1%		.4%
Total		48.5%	51.1%	.4%	100.0%

Figure 4.24: Use of electronic libraries to read electronic books?

4.6.3: The use of computers in doing exercises in subjects

Figure 4.25 reveals that q66 has a probability significance value of 0.106 which is greater than 0.05. This indicates that there is no significant difference between gender group (male and female) perceptions towards the above question.

T-Test : Gender

		t	df	Sig. (2-tailed)
Q66: how would you feel about the use of computers in doing/setting exercises in subjects during free periods?	Equal variances assumed	-1.619	795	.106
	Equal variances not assumed	-1.621	794.991	.105

Figure 4.25: Use of computers doing exercises?

This means that males and females have almost similar types of perceptions towards the use of computers in doing exercises in subjects during free periods, and that there is no huge differences in their opinions.

4.6.4: How much formal training have you had in computer literacy

Figure 4.26 indicates that the probability significance value of 0.555 for q69 is above 0.05. It reveals that statistically there is no significant difference between gender groups' perceptions towards the above statement.

T-Test : Gender

		t	df	Sig. (2-tailed)
Q69: how much formal instruction/training have you had in computer literacy?	Equal variances assumed	.591	795	.555
	Equal variances not assumed	.591	789.777	.555

Figure 4.26: Formal training in computer literacy?

The results indicate that males and females have almost similar types of experiences towards formal training in computer literacy and that there is no huge difference in their opinions.

4.6.5: How useful would your own pc be to you in your schoolwork

Figure 4.27 shows that the probability significance value of 0.992 is greater than 0.05. It reveals that statistically there is no significant difference between gender groups' perceptions towards the above question.

T-Test : Gender

		t	df	Sig. (2-tailed)
Q73.2: how useful would your own pc be to you in your schoolwork?	Equal variances assumed	-.009	795	.992
	Equal variances not assumed	-.009	790.426	.992

Figure 4.27: Own pc for your schoolwork?

This means that males and females have similar types of perceptions towards the ownership of a pc when doing their schoolwork and that there is no difference in their opinions.

4.6.6: Correlation between question 61 and questions 62-66

Figure 4.28 reveals that, measured by the Pearson significance test, the responses of all 800 respondents to question 61 (q61) correlate with q62-q64 at a significance level of .000, that q61 correlates with q65 at a significance level of .001, and that q61 correlates with q66 at a significance level of .022. It can therefore be concluded that there is an extremely strong degree of positive correlation for the answers given to q61-q66. It can further be stated that all of the correlations comfortably fall within half a degree of freedom (respectively .326, .270, .142, .114 and .081).

4.6.5: Correlations

The researcher was guided by the types of questions in the questionnaire. The researcher decided to use questions 61-67 and 69-71 because these questions are based on continuous measurement research questions. The remaining questions in the questionnaire are categorical research questions. So, correlations are only valid for the research questions which are based on continuous measurement questions.

		Correlations				
		Q62	Q63	Q64	Q65	Q66
Q61	Pearson Correlation	.326**	.270**	.142**	.114**	.081*
	Sig. (2-tailed)	.000	.000	.000	.001	.022
	N	800	800	800	800	800

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

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

Figure 4.28: Pearson test, demonstrating absolute significance between q61 & qs62-66

The above questions in full are:

Q61: If you and your classmates 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?

Q62: If you and your classmates 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?

Q63: 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 your teacher?

Q64: If you could use electronic libraries on the Internet to read electronic books, encyclopedias, dictionaries, newspapers and magazines, how would you feel about it?

Q65: If you could watch videotaped lessons during free periods, to help you with your schoolwork, how would you feel about it?

Q66: If you could use a computer to do exercises and tests in subjects like mathematics, physics and history, during free periods, how would you feel about it?

The overwhelming majority of learners (about 740 and above out of 800 respondents) responded positively towards the above questions by indi-

cating that they would welcome the opportunity to learn using the above electronic devices.

4.6.7: Correlation between question 62 and questions 63-66

Figure 4.29 below shows that, measured by the Pearson significance test, the responses of all 800 respondents to question (q) 62 correlate with q63 –q66 at a significance level of .000. It is therefore concluded that there is positive correlation for the answers given to q62 – q66. It can also be stated that all the correlations fall within half a degree of freedom (.265, .142, .233, and .158).

		Correlations			
		Q63	Q64	Q65	Q66
Q62	Pearson Correlation	.265**	.142**	.233**	.158**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	800	800	800	800

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

Figure 4.29: Pearson test demonstrating absolute significance between q62 & qs63-66

The results reveal that the majority of learners about (730 in each question out of 800) showed interest in the above electronic learning facilities. Learners also highly favored the idea of introducing the above electronic devices in their schools.

4.6.8: Correlation between question 62 with questions 73.1 – 73.5

Figure 4.30 reveals that, measured by the Pearson significance test, the responses of all respondents to question (q) 62 correlate with q73.1 and q73.3 at a significance level of .001, that q62 correlates with q73.2 at a significance level of .003 and that q62 correlates with q73.4 and q73.5 at a significance level of .000. It can therefore be concluded that there is a degree of positive correlation for the answers given to q62 with q73.1 – q73.5. It can also be

concluded that all of the correlations fall within half a degree of freedom (respectively .117, .106, .121, .149, .160).

		Correlations				
		Q73.1	Q73.2	Q73.3	Q73.4	Q73.5
Q62	Pearson Correlation	.117**	.106**	.121**	.149**	.160**
	Sig. (2-tailed)	.001	.003	.001	.000	.000
	N	800	800	800	800	800

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

Figure 4.30: Pearson test demonstrating absolute significance between q62 & qs73.1-73.5

The above questions in full are:

Q62: If you and your classmates 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?

Q73: How useful could the following technologies be to you in your school-work?

Q73.1: VCR linked to a TV

Q72.2: Own PC

Q73.3: PC network

Q73.4: Satellite TV/ DStv

Q73.5: Internet (& e-mail)

The analysis reveals that the majority of respondents, more than 769 out of 800 in each question, indicated that they would welcome the opportunity to learn using the above-mentioned electronic technologies in their schools.

4.6.9: Correlation between question 64 with questions 65 –67

Figure 4.31 shows that, measured by the Pearson significance test, the responses of all respondents to question q64 correlate with q65 –q67 at a significance level of .000. It can thus be concluded that there is a positive correlation for the responses given to q64 with q65 – q67. This shows that correlation in this table falls within half a degree of freedom (respectively .244, .319, .321).

Correlations

		Q65	Q66	Q67
Q64	Pearson Correlation	.244**	.319**	.312**
	Sig. (2-tailed)	.000	.000	.000
	N	800	800	800

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

Figure 4.31: Pearson test demonstrating absolute significance between q64 & qs65-67

The above questions in full are:

Q64: If you could use electronic libraries on the Internet to read electronic books, encyclopedias, dictionaries, newspapers and magazines, how would you feel about it?

Q65: If you could watch videotaped lessons during free periods, to help you with your schoolwork, how would you feel about it?

Q66: If you could use a computer to do exercises and tests in subjects like mathematics, physics and history, during free periods, how would you feel about it?

Q67: If it could be possible for the KZN Minister of Education to appear on a TV screen in your classroom and talk to you directly, instead of visiting your class in person, how would you feel about it?

The information above indicates that about 780 learners out of 800 would welcome the practical use of the electronic learning facilities in their schools, as they would be practically involved in their learning.

4.6.10: Correlation between question 69 with questions 70 and 71

Figure 4.32 indicates that the answers of all 800 learners to question q69 correlate with q70 and q71 at a significance level of .000. It can therefore be concluded that there is a positive correlation for the responses given to q69 with q70 and q71. This indicates that correlation in the above table fall within half a degree of freedom (respectively .566 and .207)

Correlations

		Q70	Q71
Q69	Pearson Correlation	.566**	.207**
	Sig. (2-tailed)	.000	.000
	N	800	800

**. Correlation is significant at the 0.01 level

Figure 4.32: Pearson test demonstrating absolute significance between q69-qs70-71

The above questions in full are:

Q69: How much formal instructions in computer literacy have you had in class?

Q70: How much informal instruction in computer literacy have you and your classmates provided to one another outside of class about things that interest you as a group of friends (e.g. website design or computer animation)?

Q71: How much training in computer literacy have you undergone privately on your own initiative?

The results above reveal that about 795 respondents in each question out of 800 do not have computers and other electronic learning facilities in their homes and schools. The unavailability of electronic learning facilities to almost all the learners means that no training can take place.

4.7: The degree of e-readiness of an electronically empowered rural public school – a case study

The researcher visited one of the schools in KZN which received five active boards and five computers from the British Department of Trade and Industry as a donation. This school cannot be identified by name for ethical reasons. It is not a typical rural school as in contrast with the surrounding area, it has electricity, flush toilets, running water (taps), etc.

The researcher spoke to educators and learners about these teaching and learning devices. As educators did not know how to use them, the British

donors organized a workshop for one week training teachers on how to use the active boards. The educators enjoy working with these boards but cannot afford to buy more boards, so that each class could have one, because they are very expensive. Learners said that at first they were happy to see these new boards, but that they are not allowed to touch them.

The researcher asked the principal why learners are not allowed to touch the equipment during learning periods and how they could benefit from these boards. He responded that they would like to allow their learners to be practically involved by using these boards, but at the moment the school could not afford the maintenance cost of the overhead projectors, mobile mouse and white board pens, which are very expensive, especially if they are finished or broken. He also said that learners do benefit from the software which is used by educators, but that learners are not actively involved during the lesson because classrooms are overcrowded. At first they tried to involve learners as a poor school that survives through donations, it costs a lot of money to fix broken equipment, so learners were no longer allowed to work with the equipment.

From this case study it can be concluded that learners are not ready for e-education, and that introducing e-education in 2013 can only be successful if the government ensures that electronic devices that will be needed by schools are available to and affordable by all schools.

4.8: Conclusion

In this chapter the researcher presented the results of an empirical study of how public school learners in KwaZulu-Natal urban communities perceive e-education.

Tables and graphs were used to give a general demographic characterization of the respondents (grade 9 and 11 learners) that participated in this study, to analyze how frequently do the learners use electronic communication devices at home and at school, to identify whether schools do have any

or enough electronic learning facilities, and to provide information about the availability of ICT infrastructure in schools.

The perceptions and conceptions of learners about the use of information communication technology in educational settings, as well as the correlation between demographic factors, application factors and perceptual factors, were analyzed by means of tables.

In the last section of this chapter the researcher presented a case study to check the degree of e-readiness among learners at a specific school in a rural setting.

In the next chapter the researcher will present the conclusion and recommendations about what needs to be done before the successful implementation of e-education in KwaZulu-Natal urban (Zulu) schools can take place and what practical strategies need to be applied to overcome obstacles during implementation.

Chapter 5

Conclusions and Recommendations

5.1: Introduction

In this chapter the researcher will present conclusions and recommendations regarding the perceptions and conceptions about electronic education among learners in KwaZulu-Natal. The results of the survey together with the findings that were received through the use of graphs and tables extracted from the SPSS 13, disclosed that learners in secondary schools in KwaZulu-Natal are not yet ready for the implementation of e-education in 2013 (meaning learners are not ready to learn in an electronically managed educational environment).

5.2: Review of the Research

In chapter one the researcher presented an overview of this dissertation by stating how it was organized, and outlined the statement of the problems and the research procedure.

In chapter two the researcher dealt with the literature survey. This included the role of the concept matrix in the literature survey, literature pertaining to theory, and how ICT could contribute to electronic education. The researcher also included a synthesis of the theoretical framework and a characterization of the research methodology.

In chapter three the researcher presented an account of the research methodology that was employed to conduct the research.

In chapter four the researcher explained the results of the survey and presented the findings extracted through the use of tables and graphs

In this chapter the researcher presents an overview of this dissertation, by demonstrating to what extent the empirical results answer the research ques-

tions, thereby meeting the research objectives. At the end of the chapter the researcher places the appropriate limitations on the validity of the results and makes recommendations with regard to e-Education.

5.3: Answers to Research Questions

This research aimed at providing answers to the five research questions that were posed in chapter one. These questions were formulated based on information derived from the data analysis that was used in chapter one verified and from the literature review in chapter two.

Question One: What are the perceptions and conceptions about e-Education among urban secondary school learners at public schools in and around Durban?

Using graphs and tables derived from part 5 of the questionnaire , starting from questions 61 to 67 to answer question one; the findings revealed that about 90% of learners perceive electronic education as an answer to their learning problems and in comparison with other models of education, as the best method of learning.

Question Two: To what extent have learners around Durban been using e-Education and e-Learning in school settings?

To answer question two, the researcher used a literature review and data analysis. The findings revealed that less than 1% of learners around Durban in Zulu urban settings are using e-education and e-learning in school because of the unavailability of ICT infrastructure in schools and at homes; furthermore, that for the same reason, no learners have been utilizing commercial education and edutainment software for formal learning.

Question Three: What are the perceptions and conceptions of learners about the relationship between e-Education and other models of education delivery in an e-Education setting?

In order to answer question three, the researcher used a literature review together with data analysis to examine the perceptions and conceptions of learners about the relationship between e-education and other models of education delivery. The findings revealed that the community at large is in favour of the introduction of e-education for the societies to be able to meet the demands of the world of technology, for the growing generation to be able to compete with the global world, and to contribute to the economy of their country.

Question Four: To what extent have learners been utilizing commercial education and edutainment software for formal and informal learning?

The data analysis revealed that learners in Zulu urban communities have never been exposed to commercial education and edutainment software. Graphs and tables that were used to answer question 4, were graphs, figure 4:18 and 19, tables, figure 4:20, 21 and 22 revealed that learners are enthusiastic about the possibility of being exposed to learning through edutainment software and commercial education. They support e-education because they would learn at the same time as being entertained.

Question Five: To what extent the Zulu public school learners have been using the Internet to access learning material that relate to formal and private use.

The literature review and data analysis revealed that there is no correlation between the skills reported by the respondents and their perception and conception about e-education and e-learning. Learners have not yet been trained to operate these electronic devices that will enable them to learn electronically.

5.4: Limitations

In view of the fact that: the survey is based on a random sample which was done before the researcher started to do this study; the researcher used double the number of respondents which were required for this study; all the research questions identified in chapter one were answered, and a case study

was conducted to support the quantitative data, it is not necessary to put any limitations to this study.

5.5: Major findings

The following four major findings emanate from this study:

- No significant empirical prior research has been done about the state of e-readiness of learners in KwaZulu-Natal public schools.
- The vast majority of learners are very positive about studying in an e-education environment
- Very few learners have been exposed to any form of e-education
- According to a case study reported, neither teachers nor learners were able to make effective use of sophisticated and expensive active boards that were donated by the British Department of Trade and Industry.

5.6: Recommendations

In 2003 the South African Government published the White Paper on e-Education according to which all South African public schools should operate as electronically managed schools by 2013 for the successful introduction of e-education in public schools in KwaZulu-Natal (KZN).

Before e-education can be introduced in public schools in KZN by 2013, as proposed in the South African Government's White Paper on e-education, it must be empirically established whether learners are ready to learn effectively in an electronically managed environment.

Therefore, the researcher would like to present three recommendations that need to be taken into consideration by the government:

- It is the responsibility of the government to accelerate the extension of ICT infrastructure at an affordable cost to promote the use of ICT in education.
- The government should provide training for educators so that they would be able to utilize ICT facilities. It is the government's responsibility to see to it that relevant people in the department of education are trained, so that they will be able to effectively manage the implementation of e-Education. Training is very important if people are not trained, e-facilities will become white elephants.
- The government must be prepared to provide funds for all the equipment that will be needed by schools, including hardware and software.

5.7: Conclusion

In this chapter the researcher presented an overview of this dissertation, demonstrating to what extent the empirical results answered the research questions, thereby meeting the research objectives. The appropriate limitations on the validity of the results were discussed and major findings with regard to e-Education were reported and certain recommendations were presented.

The results of the study revealed that many Zulu urban schools around Durban do not have ICT infrastructure; this means that schools and learners are not yet ready for the implementation of e-education in KZN by 2013, as envisaged in the Department of Education's 2003 White Paper on e-Education.

Therefore, for the introduction and implementation of e-education to be successful all stakeholders need to work hard in developing schools to widen the accessibility of learners to ICTs.

Addenda

Addendum 1: Ethical clearance

RESEARCH OFFICE (GOVAN MBEKI CENTRE)
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15 JANUARY 2007

MS. ZR MAZIBUKO (204002219)
INFORMATION SYSTEMS & TECHNOLOGY

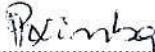
Dear Ms. Mazibuko

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/06909A

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

“Perceptions and conceptions of e-Education- An empirical analysis how learners in urban communities of KwaZulu-Natal feel about e-Education”

Yours faithfully


.....
MS. PHUMELELE XIMBA
RESEARCH OFFICE

096771

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

Addendum 2: Research instruments

Confidential Survey of Grades 9 and 11 Learners At Public Schools in KwaZulu-Natal

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

Researcher: Ms. ZR Mazibuko-204002219

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 learner

- 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 other classmates 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 _____ (please provide your 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 identity Of the organisation of 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

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 grade: _____

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 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 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 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 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 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 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 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 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 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 classmates 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 classmates 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 your teacher?

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 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 do 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 to appear on a TV screen in your classroom and talk to you directly, instead of visiting your class 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 select it as a matric subject?
- Yes No Unsure
69. How much formal instruction in computer literacy have you had in class?
- Advanced Intermediate Basic None
70. How much informal instruction in computer literacy have you and your classmates provided to one another outside of class 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 linked 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

Thanks again for helping us with this survey!

Addendum 3: Concept matrix

Rist and Hewer (1999)				✓															
Rugbeer (2005)	✓																✓		
SA White Paper on E-Education 2004	✓		✓	✓	✓	✓	✓		✓	✓				✓			✓	✓	
Sachs (n.d.)			✓	✓	✓					✓	✓								
Terry and De Freitas (2004)				✓															
The Notional Protocol (2005)																		✓	
Wilson (n.d.)	✓																		
Wikipedia (2008)															✓				

Addendum 4: Significance Tables

T – Test: Gender

Table 1

T- Test : Gender

		gender			Total
		female	male	spoilt response	
Q61: how would you feel about working on projects and linking with other overreaseas schools on the intrenet?	excellent	40.9%	39.9%	.1%	80.9%
	good	7.1%	9.9%	.3%	17.3%
	bad		.3%		.3%
	very bad	.1%	.6%		.8%
	spoilt reponse		.1%		.1%
	no response	.4%	.4%		.8%
Total		48.5%	51.1%	.4%	100.0%

Table 2

T-Test : Gender

		gender			Total
		female	male	spoilt response	
Q64: how would you feel if you could use electronic libraries on the interent to read electronic books?	excellent	44.0%	42.3%	.3%	86.5%
	good	3.9%	7.3%	.1%	11.3%
	bad	.3%	.1%		.4%
	very bad	.1%	.3%		.4%
	spoilt reponse		1.1%		1.1%
	no response	.3%	.1%		.4%
Total		48.5%	51.1%	.4%	100.0%

Table 3

T-Test : Gender

		t	df	Sig. (2-tailed)
Q66: how would you feel about the use of computers in doing/setting exercises in subjects during free periods?	Equal variances assumed	-1.619	795	.106
	Equal variances not assumed	-1.621	794.991	.105

Table 4

T-Test : Gender

		t	df	Sig. (2-tailed)
Q69: how much formal instruction/training have you had in computer literacy?	Equal variances assumed	.591	795	.555
	Equal variances not assumed	.591	789.777	.555

Table 5

T-Test : Gender

		t	df	Sig. (2-tailed)
Q73.2: how useful would your own pc be to you in your schoolwork?	Equal variances assumed	-.009	795	.992
	Equal variances not assumed	-.009	790.426	.992

Correlation Tables

Correlation Table 1

		Correlations				
		Q62	Q63	Q64	Q65	Q66
Q61	Pearson Correlation	.326**	.270**	.142**	.114**	.081*
	Sig. (2-tailed)	.000	.000	.000	.001	.022
	N	800	800	800	800	800

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

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

Correlation Table 2

		Correlations			
		Q63	Q64	Q65	Q66
Q62	Pearson Correlation	.265**	.142**	.233**	.158**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	800	800	800	800

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

Correlation Table 3

		Correlations				
		Q73.1	Q73.2	Q73.3	Q73.4	Q73.5
Q62	Pearson Correlation	.117**	.106**	.121**	.149**	.160**
	Sig. (2-tailed)	.001	.003	.001	.000	.000
	N	800	800	800	800	800

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

Correlation Table 4

Correlations

		Q65	Q66	Q67
Q64	Pearson Correlation	.244**	.319**	.312**
	Sig. (2-tailed)	.000	.000	.000
	N	800	800	800

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

Correlation Table 5

Correlations

		Q70	Q71
Q69	Pearson Correlation	.566**	.207**
	Sig. (2-tailed)	.000	.000
	N	800	800

** Correlation is significant at the 0.01 level

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