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NONDONGA, FEZILE WYCLIFF

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FACTORS AFFECTING THE IMPLEMENTATION OF INFORMATION COMMUNICATION TECHNOLOGY (ICT)-GAUTENG ONLINE IN PRIMARY SCHOOLS

FEZILE WYCLIFF NONDONGA

A research report submitted to the University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master's of Management (in the field of Public and Development Management)

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Abstract

The global ICT revolution has led to the introduction of numerous education related ICT projects worldwide. The ICT introduction in education has resulted in an abrupt transformation and changes. These changes pose various challenges and risks. Some of these projects have succeeded, and some have failed. In 2002, the GDE introduced the GOL project to benefit learners, educators, and the community at large.

The purpose of this exploratory study was to identify and investigate factors that have lead to the successful use or failure of using GOL in primary schools. Some of the findings were that inadequate costs, lack of access, lack of training, lack of technical support, theft, and vandalism were the main barriers faced by schools. It was also established that perception and attitude, socio-economic factors, and infrastructure were other crucial barriers. Lastly, it emerged that GOL was used for various activities, depending on the user's level of competence and knowledge.

DECLARATION

I declare that this research is my own, unaided work. It is submitted to the University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master's of Management (in the field of Public and Development Management).

It has not been submitted before for any degree or examination at any university.

FW Nondonga

November 2008

DEDICATION

This study is dedicated to my son, Chuma Inga Nondonga; his birth made me realise that life is a precious gift and that anything is possible.

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List of abbreviations

GDE:	Gauteng Department of Education
BECTA:	British Educational Communications and Technology Agency
DoE:	Department of Education
GOL:	Gauteng Online
GP:	Gauteng Province
HOD:	Head of Department
ICT:	Information and Communication Technology
ICTs:	Information and Communication Technologies
IT:	Information Technology
MM (PDM):	Master's of Management in Public and Development Management
PGP:	Personal Growth Plan
RSA:	Republic of South Africa
SA:	South Africa
SMT:	School Management Team

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1 Introduction and background of the study

1.1 Introduction

> *Information and communication technologies (ICTs) are central to the changes taking place throughout the world. ICT has emerged as the most prominent technology to have a revolutionised effect on the lives of people across the world. The Worldwide Web has emerged as a powerful tool for social and economic development. New models of learning are radically changing our concept of education* (GDE, 1999: 5).

It is against this background that various education ICT projects have been developed worldwide. This has happened in many countries including Scotland, Uganda, the United Kingdom, the United States of America, Chile, Canada, and even here in South Africa (BECTA, 2004). It is believed that ICT presents great opportunities in developing countries such as South Africa. However, these projects are faced with various challenges and further present risks (GDE, 1999: 5).

South Africa as a newcomer has recently seen small-scale ICT education projects in various provinces, such as SchoolNet SA, Internet 1000, Internet 2000, Connectivity, and Khanya (RSA, 2003: 1). The Gauteng Department of Education (GDE) states that the introduction of ICT in South African schools is aimed at addressing resource allocation imbalances caused by the apartheid system of education, which benefited a certain race group (GDE, 1999: 3). The introduction of ICTs in education has resulted in an abrupt transformation and changes in the education system of the country. These changes arose from shifts in educational goals and from new concepts in learning and knowledge creation. These changes further pose challenges and risks (RSA, 2003: 1).

In 2000, the Gauteng Department of Education (GDE) introduced a new programme, *Gauteng Online (GOL)*. The main aim of the project was to connect and provide ICTs to all Gauteng schools, focusing on the previously disadvantaged schools (GDE, 2001/2002: 3).

This is an exploratory study aimed at identifying and investigating factors that impact on the implementation of GOL, particularly in District 11 primary schools. The main focus of this study is on identifying enabling factors, challenges, or barriers faced by the Gauteng primary schools in their quest to accommodate and implement GOL or the new models of learning.

The GDE believes that GOL provides a model adequate for sustainable use of ICTs in education. This assertion is supported by the beliefs and claims that developments in ICT help to:

- *create access to learning opportunities;*
- *redress inequalities;*
- *improve the quality of learning and teaching; and*
- *deliver lifelong learning (RSA, 2003).*

The background and objectives of the Gauteng Online project are clearly defined and discussed in depth in the following section. The last section of this chapter provides an outline of the entire document.

1.2 Background of the study

The GOL project was launched in 2002 by the GDE. The intentions were to introduce and connect ICTs to all Gauteng schools. As a result, the GDE incurred all the costs of installing computers in schools, and each school was provided with twenty-five computers and other ICT tools at a cost of R500 000. Gauteng provincial government contributed R500 million (GDE, 2001/2002: 3). This contribution forms part of the Premier's Office's commitment to the project,

since the project was initiated by the same office. In 2002, the Gauteng Premier (Mbhazima Shilowa) made a statement at the opening of the legislature about the GOL concept (GDE, 2003/2004: vii). The concept was later adopted by the provincial cabinet as one of the strategies aimed at uplifting Gauteng society and growing the economy of the province (GDE, 2001/2002: 3).

The following objectives and outcomes concerning the programme were drawn up:

- *Contribute towards building the human resource capacity of the province and the country through the provision of quality education.*
- *Contribute towards stimulating positive economic activity in the country through the creation of a strong local information technology (IT) industry that has a capacity for IT development and innovation.*
- *Enhance the efficacy of government for improved service delivery and a better life for all.*
- *Position the province at the cutting edge of change through technological innovation.*
- *Bridge the digital divide* (GDE, 2001/2002: 3).

The project started as a pilot in 30 schools from 12 GDE districts to generate institutional knowledge that would guide the GOL team and the rest of the department in the full roll-out in 2 500 schools (GDE, 2001/2002: 35). The department challenged and encouraged the major players in the ICT industry to form a consortium around leadership and to design a global solution for the schools to be able to use ICTs. This was to include education, training, productivity, and management software to deliver technology and the Internet effectively (GDE, 2001/2002: 35).

The GDE also committed itself to carry out all infrastructure refurbishments such as security, bricks, and mortar (GDE, 2001/2002: 35). Education specialists were flown from overseas countries, and some were procured locally, and the different training options were tried. Further, a range of technologies were deployed, ranging from fat to thin client and wireless laptop, landlines, and satellites (GDE, 2001/2002: 35). Until the date of completing this study, functioning computer laboratories have now been installed in more than 2 000 schools. More than 20 000 educators attended 16 hours of training to prepare them for the project (GDE, 2001/2002: 35).

It is worth mentioning that GOL is not the only school ICT project; there are various other projects in other provinces. However, the provinces are at different levels of implementing ICTs in education. Significant progress has been made through different ICT initiatives in provinces such as the Western Cape (Khanya project), Gauteng (Gauteng Online), and the Northern Cape (Connectivity project) (RSA, 2003: 4). However, the extent and success of the implementation and integration of these initiatives with the curriculum are yet to be established.

The national Department of Education claims that Gauteng schools have more ICTs than schools from other provinces (RSA, 2003: 4). The assumption behind these claims is that all GOL-connected schools in Gauteng are implementing these ICTs without challenges. To support ICT initiatives, the South African government issued an e-learning framework to guide provinces that have already introduced ICTs in schools and also to help them overcome challenges. The national Department of Education acknowledges the significance of using ICTs in schools and commends the progress made by various provinces to introduce ICTs in schools. This emerged in a statement made by the former Minister of Education, Dr Kader Asmal, that:

> *ICTs are central to the changes taking place throughout the world…. ICTs has opened up new learning opportunities and provided access to educational*

> *resources. The introduction of ICTs in schools is creating new ways for students and teachers to engage in information selection, gathering, sorting and analysis (RSA, 2003).*

The assumption from the statement made by Dr Kader Asmal is that ICTs provide solutions to South African education challenges of transformation and that connected schools are successfully using ICTs. There is no doubt that ICT in South African will bring more benefits to society. However, one could also argue that the introduction of these ICTs in schools is faced with lots of unidentified challenges – hence, the slow progress in other provinces. These challenges are emerging at different levels of the education system and at the different stages of introducing and implementing these ICTs. This has resulted in different views and perceptions by the education role players and critics such as Scrimshaw on how to successfully integrate and implement ICTs in education, particularly in primary schools (2004: 4). Views about personal characteristics of teachers and their influence on the extent to which they take up an innovation such as GOL has been raised.

1.3 The problem statement

The introduction of ICTs in education through various provincial initiatives is widely praised by role players in the South African education sector. However, there seem to be scepticism about the readiness of the education institutions and about the relevance, use, and effectiveness of these ICTs.

The Gauteng Department of Education introduced Gauteng Online in 2002, arguably the largest provincial ICT education initiative in the country. It is perceived by the national government to be leading in implementing ICTs in schools as compared to other provinces. This makes one assume that Gauteng province is achieving the set objectives of GOL as discussed in the previous

section, that it is succeeding in implementing GOL, and that it has all the necessary prerequisites and effective policies/strategies to ensure the successful use of the ICTs. However, since ICTs were introduced in Gauteng schools in 2002 under the GOL banner, various media reports have indicated a generally low level of implementing GOL, and in some schools, the facilities have never been used. These reports suggest that Gauteng schools are faced with challenges, thus making the project a failure. Further, limited research has been conducted to document factors that lead to successes and failures of the GOL initiative.

One significant problem is the lack of understanding of how to implement ICTs in order to improve learning and teaching in most GOL-connected primary schools. This leads to GOL implementation failure or retardation by all users within the school environment. In addition, a lack of focus on actual GOL implementation explains why GOL implementation problems still occur. Before substantial progress can be made to remedy deficiencies in GOL implementation, a better understanding is needed.

In this regard, this study seeks to answer the following question: what are the factors that affect the effective implementation of GOL in primary schools?

1.4 Purpose statement

The purpose of this study is to investigate and identify factors that contribute to successful implementation of GOL; also, to identify factors that inhibit the implementation and uptake of the GOL project in D11 primary schools; further, to suggest strategies and models aimed at achieving and improving the implementation of ICTs in education. Lastly, this study will further address a research need, as there is minimal research available around the implementation of ICTs in primary schools.

1.5 Organisation of the report

The research report has been divided into six chapters. Chapter 1 covers the introduction and gives detailed background about GOL. This chapter further introduces and summarises the objectives of the research report, which are to explore and identify factors affecting the implementation of GOL in primary schools. Chapter 2 covers the literature review, which provides insight from various scholars in the field of ICTs in education. Chapter 3 deals with research questions and methods and further gives background to the choice of using interviews for data collection. The chapter ends with methods of data recording, the significance of the study, and the limitations of the study. Chapter 4 covers data presentation. Chapter 5 covers data interpretation and analysis. Chapter 6 presents the conclusion and recommendations.

2 Literature review

2.1 Introduction

This section seeks to explore views and insights expressed by various scholars in assessing and evaluating the introduction and the implementation of ICTs in education. The literature review also focuses on the problem of this study in seeking answers to the research questions. Facts and information around the following key elements will be gathered in the following sections of this literature review: definitions; evolution and introduction of ICT in education; ICTs in South Africa; global lessons learned; external and internal factors; factors affecting the implementation of ICTs in schools; benefits of using ICTs in education; and the conclusion.

2.2 Definitions

What is ICT? ICT can be regarded as both a driver and an enabler for effective learning and teaching. ICT is the term used to describe equipment (hardware) and computer programs (software, network, and media) that allow us to collect, access, retrieve, store, organise, process, manipulate, transmit, and present information by electronic means (Cyber law, nd: 1).

Bialobrzeska and Cohen argue that ICTs are technologies that together support people's ability to manage and communicate information electronically (2005: 5). One could argue that utilisation of ICTs requires a certain level of knowledge and information. From these definitions, it appears that there is no specific definition used for what we mean by ICTs in education. This has resulted in the synonymous use of various concepts such as e-learning, m-learning, online learning, computer-based learning, Internet-based learning, etc.

What is IT? According to Smith, IT refers to skills, knowledge, and understanding to make appropriate productive use of ICT. Smith's definition of IT clearly provides the distinction between IT and ICT. This definition implies that ICTs are tools or equipment used to support learning and teaching (IT), tools such as email, computers, telephone, the Internet, and CD-ROM (1999: 7).

It is clear from the above definitions that ICTs are defined according to the tools that they entail and the tasks they perform. However, the distinction provided by Smith in his description of IT and ICT links very well with the GOL objectives of providing tools to enhance learning and teaching in previously disadvantaged schools. Therefore, this study adopts Smith's definition with a particular focus on the use of computers in education.

2.3 The evolution and introduction of ICTs in education

People's interactions are determined and enhanced by the sharing of information and knowledge; their daily activities are based on, and performed through, ICTs, and they learn from one another. Siribodhi supports this notion that the evolution of technology has an impact on the way we live, work, teach, and learn (Siribodhi, 2001: 1). This view that ICTs have had a revolutionary impact on the way we do business, live, and learn is supported by Herselman (2003: 945). Similarly, Addo (2003) argues that computer technology today spans all spheres of social and economic activity, making significant impacts on the lives of people (Addo, 2003: 19). Addo further argues that the world economy today has shifted emphasis from production to knowledge, thus leading to what has been termed "*Information Age; New Economy; Knowledge Era and Information Society"* (Herselman, 2003: 945). In an RSA (2003) document, it is stated that ICT is driven by the changing nature of work, the realities of the information age, new global partnerships, and an awareness of the need for equal distribution of educational opportunities (RSA, 2003). However, in order for people to use ICTs and perform the above-mentioned activities, they need a basic understanding of

ICTs. Herselman concurs that not only do people need to understand the rapid evolution of new information and communication technologies, they also need to keep pace with the rapid changes imposed on the social structure at work, at home, in the classroom, and in the entertainment field (2003: 946).

According to some scholars like Addo, the ICT revolution is a revolution in learning, and ICT has also transformed available technologies, the means and methods of studying, the modalities of school operations, the manner of investment and expenditure of resources, and the very way we think about what education could be and should do (2003). Further, this view is supported by Todd's declaration quoted that:

> *A real learning revolution has started, in which educators use ICTs to provide learning experiences that are qualitatively different from their predecessors" (Addo, 2003: 22).*

Based on the above comments, one could highlight the significance of ICT in education and that ICT evolves through education. This assertion is supported by Sinko and Lehtinen that rapid development of ICT during the past two decades has had many points of contact with education and training (1999: 7). However, these ICTs are not adequately integrated with education and not properly used in teaching and learning. Addo states that it is important to incorporate ICTs in education and that there are rationales for the utilisation of computers in schools such as social, vocational, and pedagogical (2003: 18). The relevance and significance of ICTs in education are also supported by Michael, that the harsh reality for the twenty-first century is that if you do not have access to personal computers (ICTs) and the Internet, you cannot participate in communication, education, entertainment, and commerce (2002: 1).

Eynon calls for debate around the significance of introducing and using ICTs for teaching and learning (2005: 54). Scrimshaw supports this view that there is also

a need to evaluate and assess the introduction and the use of ICTs in schools in terms of the contribution they make to learner-centred teaching and learning (2004: 4). This view suggests that the advent of computers in education has enabled education to be flexible and available on an on-demand basis, rather than at a set time and in a set place.

2.4 ICTs in South Africa

The introduction of ICTs in South Africa dates back to the time of the apartheid regime where resources such as computers were provided to benefit a certain chosen group. This led to the haphazard introduction of various ICT programmes in Model C schools (Friedberg, 1992: 78). This is one of the elements that led to disadvantaged groups demanding transparency and transformation in the South African education system. Similarly, Addo argues that, in South Africa, the proliferation of education departments under the previous dispensation, managed and financed by eighteen different ministries, resulted in gross discrepancies and inequity in providing resources (2003: 36). It is such realities that resulted in the introduction of broader ICT projects such as World Links, School-Net, Khanya, and GOL. Such projects were a response to developing the country's demand for strategies to prepare its youth to compete in a world increasingly driven by ICT and knowledge (Hawkins, 2004: 39).

Also, these projects were initiated to bridge the digital divide. The South African government has joined in the current trends of focusing on strategies to increase access to improve the quality of education. Hawkins raises key questions such as "what defines quality education in today's global information-based economy?" and "has our education system kept pace with a rapidly changing world?" (2004: 38). Addo argues that ICTs have been an integral part of education in certain schools in South Africa for some time (2003: 5). However, many schools still do not have computers or information resources with which they can provide resource-based education. This has brought about the need for

providing South African schools with ICT tools, hence the introduction of ICT projects such as GOL.

The principal objectives of the projects are to build capacity by providing previously disadvantaged schools with sustainable solutions for mobilising the necessary technologies, skills, and education resources to prepare students and teachers to enter the networked world. However, Addo argues that lack of adequate infrastructure, illiteracy, lack of resources, multiplicity of languages, inadequate policies, and technological advances are the main challenges faced by the South African government (2003: 25). Similarly, these challenges are raised in the GOL concept document prepared and published by the GDE in 2002. The document further states that paucity of people with the necessary skills and expertise in programs is another challenge faced by initiatives such as GOL (GDE, 2002: 6).

2.5 Global lessons learnt

Various school ICT projects were introduced worldwide. Some succeeded, some failed, and some are still pending. Many developed countries such as the United Kingdom, Finland, Chile, Canada, Australia, the United States of America, and many others are leading in implementing these ICT projects. This stems from the fact that developed countries were first to introduce ICT in education and that developed countries are also leading in developing ICT software programs. However, one could argue that these countries are not at the same level of implementing ICTs in their respective systems of education. The use of ICT has become a global phenomenon aimed at transforming and developing the business world, entertainment and, not least, education (Michael, 2002: 1). Addo asserts that about 95% of computers are located in the developed countries (2003: 25). There is no doubt that developing countries can draw very good lessons from the developed countries. However, one could argue that these ICTs are faced with challenges. The challenges depend on the country's level of

development, and most countries are still in the beginning stages. In the early 1990s, countries such as Finland, the United Kingdom, the United States of America, and many others started introducing and implementing ICTs in education. The introduction of ICT in Finland's education has had an officially approved *Information Society Strategy*, which contained two main objectives:

> *To develop and utilize the opportunities afforded by the information society; and to identify and avoid possible threats related to this development (Sinko & Lehtinen, 1999: 13).*

Similarly, according to the literature from Britain by the British Educational Communications and Technology Agency (BECTA), England launched an ambitious campaign of introducing ICT in education in 1999. The government of England fully committed itself to ensuring that all schools and teachers were in a position to deploy new ICTs to raise educational standards to enhance learning in order to prepare young people with ICT skills (2004).

BECTA further suggests lessons that can be learned by developing countries in their quest to introduce and use ICTs in their education systems. These lessons relate to enabling factors that lead to successful implementation of the ICTs and challenges that inhibit the successful implementation of ICTs in schools. Various studies conducted in the above-mentioned countries have provided a list of *internal* and *external* factors, and these factors are discussed in detail in the next section.

This study adopts the above-mentioned classification to identify key factors that affect the implementation of ICTs in education as they have emerged from arguments put forward by scholars such as Sinko and Lehtinen (1999), Siribodhi (2001), Scrimshaw (2004), and Gunawardana (2005a). In a developing country such as South Africa and underdeveloped countries, challenges can be linked to various factors such as socio-economic development factors, quality, and equity.

Other factors that affect the uptake of ICTs in developing countries are different perceptions of the education role players, lack of skilled computer professionals, and poor education policies on how to integrate ICTs with the curriculum (Addo, 2003: 25). The following section provides a detailed analysis of the internal and external factors as suggested by many scholars.

2.5.1 Internal factors

Internal factors refer to factors that can be identified from or within the school and/or the district Department of Education. ICT is treated as an enabler influencing how things are done and/or should be done, especially in the economic and education sector. However, these ICTs must be integrated in the content of the curriculum. The integration and use of ICTs are faced with negative and positive factors. Seemingly, factors affecting the implementation of ICTs in schools vary and are influenced by other government policies. However, it appears that there is a link between the factors and the country's level of development.

Factors identified by BECTA are different from the ones identified in Scotland. In Britain, access to software and hardware, availability of resources, and adequate technical support (2004: 9) appeared to be the main internal factors. Scrimshaw supports these factors and further argues that there are other internal factors that lead to the successful implementation of ICTs in schools. These are:

- *the role of school leadership;*
- *planning;*
- *a whole-school approach to access to, and sharing of, resources; and*
- *a reliable technical support* (Scrimshaw, 2004: 5).

The role of school leadership refers to how flexible and approachable the school principal is. The elements of planning and a whole-school approach to access

to, and sharing of, resources refer to proper planning of ICT periods on the school timetables by the school leadership/management. Lastly, reliable technical support helps the school to keep up to date with the latest ICT trends and information. In Scotland, Stark identified similar internal factors. However, lack of adequate curriculum materials, educator perception, an insufficient number of computers in each school, and time and attention were unique to Scotland (2000: 7).

The study conducted by the group of academics drawn from various universities in Scotland for the Scottish Office of Education and Industry Department in 1998 further identified peripherals (for example, printers, scanners), motivation, and adequate examples of good use of ICTs as other internal factors (Condie and Simpson, 2004: 45 & Becta: Interchange, 2003: 63). Contrary to this, the study conducted in Finland identified different internal factors such as integration of professional expertise of educators, basic information skills, the educational system, and various forms of lifelong learning (Sinko & Lehtinen, 1999: 13). However, adequate education policies could address these internal factors (Sinko & Lehtinen, 1999: 13). Conversely, Siribodhi identified the following list of factors in Bang Kong, which can be associated with learners' and teachers' attitudes, perceptions, and their level of skills and knowledge:

- *Information gap among learners and teachers*
- *Poor confidence of learners and teachers*
- *Unskilled teachers*
- *Integration of ICTs with education*
- *Spaces* (2001: 36)

The internal factors identified from the literature review are crucial, significant, and relevant for ensuring the successful implementation of ICTs. The benefits of using ICTs in primary school education can only be seen and achieved if the ICTs are properly implemented and these factors are addressed. This requires effective and adequate policies, support, and strategies to be in place to assist

and guide schools to overcome the negative factors and encourage the positive ones. One could argue that internal factors vary and are influenced by various other factors such as socio-economic factors of the country and adequate government policies, depending on the country's level of development. These factors can be summarised as follows, and some of them are discussed elsewhere in the next section of this study:

- *Awareness and readiness of teachers and learners*
- *Poor access and illiteracy*
- *Space*
- *Capacity*
- *Equity*
- *Lack of transparency*
- *Costs*
- *Lack of trained professionals* (Gunawardana, 2005a: 33)

2.5.2 External factors

External factors refer to the challenges posed by the external environment coming from outside the school, but within the school community and stakeholders. Scrimshaw argues that local community involvement, working with other local schools, external support, participation in national ICT developments, projects, and initiatives, and peer teacher support are the main external factors (2004: 6). BECTA support this view that these factors can be supplemented by the availability of good quality training programmes, the support or ICT vision from senior management, and whole-school policies on using ICT across the curriculum (BECTA, 2004: 9). Some ICT scholars such as Gunawardana (2005b) agree on the need for quality training programmes for teachers to enhance their computer skills as the main enabling factor for the successful implementation of ICTs in primary schools. Gunawardana further argues that

there are other external factors that affect the implementation of ICTs in education such as:

- *multiculturalism, communication, and native content (language);*
- *reliable Internet connections and phone lines;*
- *spacious computer classrooms to accommodate a large number of learners;*
- *adequate resources;*
- *skilled and well-trained computer facilitator(s);*
- *access for everyone, including the community around the school;*
- *up-to-date content and reliable Internet; and*
- *telephones and web sites* (Gunawardana, 2005b: 33).

Conversely, Siribodhi suggests that the successful implementation of ICTs in education is inhibited by (cost) funds to use the resources effectively (from external sponsors and government), weak or poor infrastructure (telephone links, available rooms, and space), and assistance from private education role players (2001: 36).

NEPAD revealed that developing countries in Africa inadequately harnessed the use of ICTs in education; this is due to the following reasons: complex structural constraints, including the limited human resource base, coupled with weak institutional and regulatory capacity (2001). From the study conducted in Scotland, the same external factors were identified; researchers believed that big computer laboratories would help to address the challenge of time, since learners would not have to wait for others in order for them to access ICTs. Further, the study conducted in Scotland revealed that a well-trained computer facilitator would help the learners to understand the technical language used in ICTs and

would also help schools to keep up with new and the latest developments in using ICTs (Condie and Simpson, 2004: 45 & Becta: Interchange, 2003: 63).

In conclusion, the study observed close relationships between internal and external factors; any factors influencing one factor were also likely to influence several other barriers. This view is supported by the table below.

2.5.2.1Table: Relationship between internal and external factors

External factors	**Internal factors**
• Lack of access to resources • Lack of time • Lack of effective training • Technical problems	• Lack of confidence • Resistance to change and negative attitudes • No perception of benefits
School factors	**Teacher-level factors**
• Lack of time • Lack of access to resources (lack of hardware, inappropriate organisation, poor quality software) • Lack of effective training • Technical problems	• Lack of time • Lack of confidence • Resistance to change and negative attitudes • No perception of benefits • Lack of access to resources (personal/ home access)

Source: BECTA ICT Research, 2004: 20

If these factors are addressed, it becomes easy to implement ICT in education. To assess the relevance of both internal and external factors, the following section will explore some of the identified factors affecting the implementation of ICTs in education.

2.6 Factors affecting the implementation of ICTs in primary schools

From the literature reviewed, it appears that training and development, computer skills, financial resources, access, technical support, and adequate policies are the main factors affecting the implementation of ICTs in education. Therefore, this section seeks to discuss and describe these factors in detail.

2.6.1 Training and development

In the DoE document, the importance of training and development for ICTs in education is highlighted as one of the significant factors that affect the effective use of ICTs in education. The document asserts that every teacher, manager, and administrator in general and in further education and training must have the knowledge, skills, and support they need to integrate ICTs in teaching and learning (RSA, 2004: 25). This assertion is supported by South African legislation, the Skills Development Act, Act 97 of 1998, and the Skills Development Levies Act of 1999, which provides a framework for computer skills development for teachers (Addo, 2003: 29).

Training and development are part of the GOL project objectives, and they are targeted at learners, educators, and communities. Addo states that successful application of computers in education is directly dependent on instructional design ingenuity, backed by a solid foundation in learning theory and research (2003: 28). To support this claim, he further argues that the success and failure of using ICTs in education depend on the effectiveness of the teacher rather than the nature of the hardware or software used. This is possible if teachers are well trained and developed to acquire computer skills (Addo, 2003: 29). BECTA concurs with Addo's assertion that training can be seen in terms of teachers training themselves through experimenting and becoming more familiar with hardware and software (2003: 22). It can be concluded that if teachers are not well trained to use ICTs, it becomes impossible for them to conduct self-training

and to develop in order to gain adequate computer skills. Addo also states that computers are machines; therefore, a certain level of skill is required in order for one to be able to operate and use them effectively (2003: 30). Further, ICTs require constant maintenance and frequent upgrading; therefore, it is important that educators obtain technical skills (Addo, 2003: 31). One could argue that if educators had such skills, it would be easy for schools to deal with technical problems with which they are faced.

In conclusion, if teachers are well trained to use computers, it is possible that they will acquire the following ICT knowledge and skills:

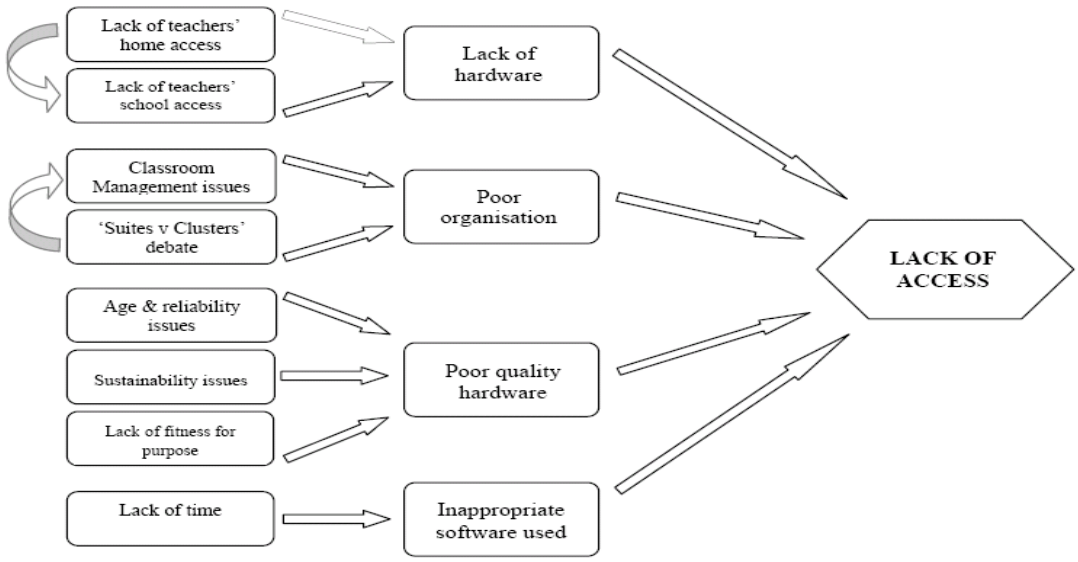
- *Hardware- or equipment-related knowledge and skills, including the ability to use a mouse and keyboard*
- *System knowledge and skills, including knowledge of network procedures and of Windows interfaces*
- *Application software knowledge and skills, including word-processing, electronic email software, and Internet software*
- *Knowledge and skills associated with the use of the information system itself – storage and search procedures and access techniques*
- *Knowledge and skills associated with using the information that is contained in the source or service* (Addo, 2003: 30)

2.6.2 Access

Access refers to the availability of ICT to be used by the learners and educators at school, thus assuming that school management allows them to use it. This assertion is supported by RSA that the impact and effectiveness of ICTs rest on the extent to which learners and educators have access to hardware, software, and connectivity (RSA, 2004: 22). BECTA (2004) states that access to ICT is a

complex barrier that encompasses a number of elements such as the ones shown in the figure below.

2.6.2.1 Figure: Elements of access



Source: BECTA ICT Research, 2004: 22

Quinn argues that technology is readily available to extend work for subjects to the home for learners. However, it is unfortunate that due to parents' income inequalities, not all learners can access ICTs at home (2005: 36). One has noticed that learners who have access to ICTs at home always have an immediate advantage over their peers. Therefore, the provision of ICTs at school is to balance such inequalities and to accommodate the disadvantaged learners.

In countries such as Britain, about 81% of learners have access to ICTs at home; this makes it easy for educators to give them assignments that involve ICTs (Quinn, 2005: 36-37). This also makes it easy for learners to do their homework through ICTs. In developing countries such as South Africa, this is the principal challenge given the socio-economic disparity and history. School websites provide an opportunity to extend the learning process outside the school;

therefore, it is important that ICTs in the school should be connected to the Internet so as to provide access to information.

2.6.3 Adequate financial resources

It can be argued that it is not cheap and easy to connect ICTs in schools. However, the value for money spent is great. For schools to get this value, there should be adequate financial resources to cater for the fluctuating costs of connecting and maintaining ICTs in schools. The funds are also needed for other ICT peripherals, such as printers, ink, and paper. The evolution of ICT results in constant maintenance, service, and upgrading. In addition, there must be qualified computer experts in each school to address technical problems.

It is against this background that scholars such as Quinn assert that it is particularly essential for sufficient funding to be in place in order to purchase the right ICT equipment (2005: 26). If there is a shortage of financial resources, it is possible that the implementation of ICTs in education will be inhibited. In developed countries such as Britain, schools with financial problems lease equipment; this helps them to upgrade without the risk of massive investment. In many developing countries, the introduction, provision, maintenance, and replacement of ICTs in education are the responsibility of the government. This result in a limited number of ICTs provided and maintained or serviced in many schools.

2.6.4 Technical support

Technical support refers to the assistance provided to schools when they experience ICT problems such as non-functioning servers, printers, and any other technically-related problems. Quinn argues that the presence of professional qualified technical assistance will result in reliable and effective ICTs in schools (2005: 26). This view is supported by Addo that information infrastructures require constant maintenance and frequent upgrading; therefore,

there must be technical personnel who look after ICTs in schools (2003: 31). Addo further suggests that these personnel should know which software can be applied in schools and give advice on the optimal use of the network (2003: 31). However, the amount and quality of technical support can vary considerably between schools. Research conducted in Britain revealed that the presence of an on-site technician to troubleshoot problems was critical to the success of embedding technology in practice (Quinn, 2005: 26). Further, it was discovered that schools that operated in an ad hoc manner with no support were faced with the danger of failing (Quinn, 2005: 27).

Quinn further states that good technical support boosts staff confidence and improves the reliability of the resources (2005: 26). In schools where there is no technical support, teachers are often reluctant to use computers because of the risk of hardware failure. In the study conducted in Britain by OFSTED, it was discovered that technical support was most effective where it was an integral part of the strategic ICT planning in schools and where there was good mutual understanding between the educators and technical staff (OFSTED, 2004: 17). Similarly, BECTA (2004) discovered that most Scottish schools were faced with inadequate and unreliable equipment and networks, difficulties in accessing the Internet, and problems with printing. Further, the other common problems were internal server failures and issues to do with the operating system's upgrade. All of these problems emerged as a result of inadequate technical support, thus leading to many schools failing to implement ICTs in education. One could conclude that effective technical support leads to significant and progressive improvement in the use of ICTs in schools.

2.7 Relevance of ICTs in education

This study has observed that learners are quick in understanding and using ICT facilities compared to adults (educators and parents). From the reviewed

literature, it has emerged that there are more benefits than challenges in using ICTs in education. These benefits emphasise the relevance of ICT in education.

Light and Littleton state that computers are used for various activities by both learners and educators interacting around, for examination purposes, for skills improvement, for preparing learning material, and for learning (1999: 2). Addo supports this argument that computers in education provide the basics of computer application, expose learners to different computer programs, and also assist in improving learning and the life chances of learners after school (2003: 18). According to Friedberg, ICTs in education encourage computer-based learning in that computers promote individual learning, computers are objective, computers help learners to develop a thorough knowledge of software tools used in the business world, and computers stimulate interest in learning (1992: 17). Stark concurs with all of the above sentiments that computers result in:

- *improved motivation for learners;*
- *enhancement of learning and teaching;*
- *improved communication for both learners and educators;*
- *improved access to information through the use of the Internet;*
- *improved efficiency in management and administration; and*
- *promotion of independence* (2000: 36).

However, critics argue that there are noticeably major disadvantages in using ICTs in education such as that learners lose a tremendous amount of time searching around one topic or aspect and the nature of ICTs, which is forever evolving, thus making ICTs expensive to maintain and upgrade.

In conclusion, it is evident that the advent and use of computers in education have revolutionised learning. ICTs have become a catalyst for teaching and learning, helping students to be less dependent on teachers and enhancing collaborative learning. Also, computers encourage learners to be innovative and further present networks for learners who participate in the building of new

knowledge. Computers lead to technology-enhanced learning, which could make education more interesting and targeted on the individual. Lastly, the above-mentioned list of benefits highlights that, through ICTs, education systems can be easily transformed, thus leading to highly skilled community individuals.

2.8 Conclusion

It is suggested by the literature that factors that affect the implementation of ICTs in education can be imposed by the internal and external environment of the school. The universal factors that were raised by most scholars were training and development, access, adequate financial resources (cost), and technical support. The literature also suggests that school leadership, planning, and the attitude of the users may affect the functioning of school ICT projects such as GOL. It is apparent from the reviewed literature that the external environment tends to bring more barriers compared to the internal environment. However, there is a noticeable relationship between these barriers. In general, these factors informed the interview questions.

It can be concluded that there is a likelihood that these factors also affect the implementation of the Gauteng Online project.

3 Research methodology

3.1 Introduction

It is stated in Chapter 2 that this study has sought to assess the implementation of GOL in terms of the factors that enable or challenge the implementation of the project. This chapter provides a detailed discussion of the process followed and techniques used to gather data in order to achieve the set objectives of this study. The section is structured as follows: research questions, chosen method, survey design, survey instrument, research procedures, data analysis and interpretation, significance of the study, and limitations of the study.

3.2 Research questions

This study has set out to investigate the factors affecting the implementation of GOL in D11 primary schools. It has sought answers to the following question:

1. What are the factors affecting the implementation of GOL in primary schools?

This main research question necessitates the following sub-questions:

- Which factors contribute to the successful implementation of the GOL project?
- Which factors hinder successful implementation of the GOL project?

From the reviewed literature, the following list of factors that affect the implementation of ICTs is suggested: *costs, access, technical support, attitude, and training*. Therefore, questions explored in the interview protocol are linked to these factors.

Costs: refer to the expense of installing, maintaining, and upgrading ICT in schools. The ICT industry is dynamic in nature, thus impacting on the costs of installing and maintaining the ICT equipment. Also, socio-economic factors

contribute to fluctuating ICT costs. During the time of writing this study, the price of installing GOL had increased by more than 20% from R500 000 to R700 000. Similarly, there are other hidden costs involved such as buying ICT consumables, for example, ink, printers, software programs, paper, and photocopying.

Access: refers to the opportunity granted to the targeted users to access ICT equipment in schools and to be able to connect to the Internet. The literature suggested that the majority of schools were experiencing connectivity problems. Further, it was mentioned that, in most cases, ICT users did not have access to ICT at homes or in communities. Thus it becomes evident that the majority of the learners come across ICT for the first time at schools.

Technical support: refers to the availability of IT support to schools in order to fix technical problems experienced by schools. There is a need for IT specialists to be deployed in schools. This view is supported by the argument made by some scholars that ICTs must be maintained and upgraded consistently and continuously.

Attitude: refers to the perception, confidence, and opinions of role players about the introduction and use of ICTs in education. Scrimshaw (2004) highlights some fundamental concerns about the perception of some principals and educators in the uptake of the school ICT projects. There are a considerable number of educators who strongly condemn the introduction of ICT in education because they think ICTs are introduced to replace them as teachers. The literature argues that some of the negative perceptions about ICT introduction are caused by the lack of confidence to use ICT. This could be related to the lack of formal ICT training.

Training: various scholars argue that the lack of advanced ICT training leads to the poor use of ICTs in education. This calls for improved and appropriate training, which must integrate ICT with the curriculum.

In conclusion, there is a relationship among all of the above factors. It appears that once adequate funds and training are provided, it becomes easy to implement ICTs in education.

3.3 Chosen method (qualitative method)

An exploratory and qualitative research design approach was adopted because of the limited previous research and lack of appropriate theory on the research topic. In this study, the qualitative method was used to collect, interpret, and analyse data. The qualitative method allows the researcher to "gather large amount of information and get more details on the case being examined" (Neuman, 1991: 331). It further allows flexibility and is concerned with a process of understanding and generating new concepts out of given information rather than with testing the existing ones (Neuman, 1991). This view is supported by Leedy & Ormrod (2004) who states that the essence of qualitative data is that it is rich, full, real, and holistic and that its validity is unimpeachable.

The adoption of the qualitative method allows the study to gain an insight and clarity as opposed to testing particular hypotheses on issues that need further explanations. The research design took the form of semi-structured interviews. This relied on the capacity of the researcher to generate and analyse data both effectively and professionally. This permitted the study to probe initial responses and gather some in-depth data from the provincial and district officials, principals, and educators.

3.4 Survey design

Research design entails a consideration of sources of data for the study, which includes or determines the significant respondents and further explains why they were chosen. Data collection tools and techniques used are also explained.

3.4.1 Sample selection

The GDE comprises twelve districts, and these districts are divided based on municipal demarcations of the Gauteng municipality regions. The district that forms part of this research study was established in 2001. Its offices are based in Soweto. It covers most of the Soweto township schools, the Johannesburg southern suburbs Model C schools, and a few private schools. The total number of district 11 schools is four hundred and fifty, most of them being primary schools.

Four primary schools were sampled to form part of the data source in this district through semi-structured interviews with education officials, principals, and educators. The respondents were first informed about the nature of the study and were also requested to participate in the study. An interview schedule or questionnaire with a set of key questions was sent to them prior to the actual arranged time of the interview(s). This enabled them to gather their thoughts. Follow-up interviews were conducted to expand the data gathering process and to acquire information that was covered by the initially sent questions. During the interview session, follow-up questions were posed to seek clarity and more in-depth information. The author of this study was the main instrument in collecting, interpreting, and analysing data. As suggested by Cresswell, conclusions made were drawn based on the data collected, and the conclusions reflected the views and opinions of the sample (2002: 18).

During the time of collecting data, the researcher worked in the same district as an education specialist in one of the Johannesburg South former Model C

schools. This allowed the researcher to gain easy access to information and direct contact with the participants. This resulted in the choice of a purposeful or convenient sample to collect data. No data was collected from the researcher's place of work, and this was done to avoid possible bias in interpreting and analysing data.

The respondents for this study were adult provincial and district officials, principals, and educators of the schools connected with GOL in district 11. All the D11-connected schools were grouped and separated according to their geographic areas. School classification types were considered, for example, township and Model C schools. Private schools were not considered for this study, since they were excluded from GOL. District officials were approached to assist in the study to secure interviews with the participants. Primary data was scheduled to be sourced from twenty (20) individuals in the following manner: semi-structured interviews with:

- one provincial (head office) official;
- one district official;
- six school principals; and
- twelve educators (GOL super-users).

However, due to some reasons mentioned elsewhere in this study, the information was sourced from fourteen (14) respondents, since two schools opted out. The population for this study were the adult provincial and district officials, principals, and educators of the schools connected with GOL in district 11.

Further, secondary data was sourced in the following manner:

- Internet searches to source data on the challenges/difficulties of implementing ICTs in primary schools
- Books, articles, and bibliographies related to the best practices of implementing ICTs in primary schools

- Library searches conducted at various resource centres of education, community libraries, and ICT centres

Sampling in qualitative study involves two actions: "setting a boundary and creating a frame" (Miles & Huberman, 1994: 27). This led to the study focusing on schools in Soweto as a boundary set for data collection. This helped to save time and travelling expenses by not collecting data beyond the set boundary. This also helped the researcher to cover the aspects within his time and means. It further helped the study to uncover, confirm, and construct basic processes that underpinned this study (Miles & Huberman, 1994: 27). This study adopted stratified random sampling. In stratified random sampling, the sampling frame is divided into non-overlapping groups or strata, for example, geographical and capacity/professional levels. A sample is taken from each stratum (Leedy & Ormrod, 2004: 159). Similarly, Denzin and Lincoln (2000) argue that the sample chosen randomly must be according to the geographical area (Denzin & Lincoln, 2000: 657). Gunning states that there are three prerequisites to the design of any survey that must be specified: purpose, population to be surveyed, and the availability of resources (2004: 35). These elements are discussed further in the following section.

3.4.1.1 The purpose

To get an understanding of, and an insight into, the experience of educators, principals, and officials in implementing GOL.

3.4.1.2 Population surveyed

According to Leedy and Ormrod (2004), sampling in qualitative research is purposeful. The participants were selected with a view to obtain the most factual information about the topic under investigation. The respondents for this study were drawn from the GDE head offices, D11 offices, and primary schools.

3.4.1.3 Resource availability

The participants did not incur costs, since the interviews took place in their places of work. This means that factors such as costs were incurred by the researcher, except that participants were asked to use their personal time.

3.4.2 Selecting respondents

The Gauteng Department of Education (head office) and D11 were selected as sample for a number of reasons. Firstly, the district is the biggest district in Gauteng, constituting four hundred and fifty schools, most of them being primary schools. Secondly, D11 entails all the different types of school categories, for example, rural, township, Model C, private, and Christian schools. The majority of the D11 schools are so-called previously disadvantaged schools. Thirdly, both the D11 location and head office location are geographically close to the researcher's place of work.

Lastly, GOL was initiated/developed, financed, monitored, and administered by the GDE head office. Much of the planning for the roll-out of this project was done by the head office, and D11 reported directly to the head office.

3.4.3 Selection of individual respondents

Fourteen (14) individuals were interviewed from the GDE head office (province), district, and primary schools. They were as follows:

- **Province:** one GOL director from the ICT Unit was interviewed in order to find out about the GOL roll-out challenges from the planner's point of view.
- **District:** one district official responsible for GOL monitoring in schools was interviewed.
- **Schools:** four school principals and eight educators from four schools were interviewed in order to get first-hand information about the challenges with which they were faced in implementing GOL.

3.5 Survey instrument

3.5.1 Semi-structured interviews

One of the highly recognised methods and popular research techniques of collecting data is interviews. Leedy and Ormrod argue that in-depth and unstructured interviews help the researcher to elicit information in order to get a balanced view of the interviewee's point of view. Further, they involve asking open-ended questions and most often result in qualitative data collection (2004: 146). Conducting semi-structured interviews is one approach to in-depth interviewing and was used to collect information from provincial, district, and school staff of the GDE. The researcher believed that this type of interview would allow the participants to express themselves.

A semi-structured interview schedule was prepared as a guide for each interview, and a range of questions relating to factors affecting the implementation of ICTs in education were explored with the respondents at different levels. In most cases, the questions asked were not fundamentally different, although they varied depending on the respondent's line of work or level of employment. However, because a particular set of questions was ultimately explored as part of each interview, this made the research analysis and process easier, as responses could be grouped around similar themes. An audio tape was also used to record/capture interviews. This was used to minimise the time the researcher needed to capture the interviews and, thus, made the interview process more interactive and conversational.

The fact that this study used semi-structured interviews allowed the researcher and participants to be more flexible, and participants were likely to yield information that the researcher had not planned to ask for and to come up with follow-up questions (Leedy & Ormrod, 2004:159). This type of interview was useful in this study, since it allowed participants to be more flexible and creative (Denzin & Lincoln, 2000: 657). Also, it related to the suggested list of

advantages of using semi-structured interviews, such as the ones identified below.

- ***Flexibility:*** the researcher could probe for more specific answers and could repeat the question when the response indicated misunderstanding.
- ***Response rate:*** the interview tended to have a better response rate.
- ***Non-verbal behaviour:*** the interviewer was always present to observe the non-verbal behaviour and to assess the validity of respondents' answers.
- ***Control over the environment:*** the researcher standardised the interview environment by making certain that interviews were conducted in privacy.
- ***Question order:*** the researcher had control over question order and made sure that respondents did not answer out of order.
- ***Spontaneity:*** the researcher had a chance to record all the informative spontaneous answers.

However, one could argue that interviews can be time-consuming and misleading if the interviewer does not prepare adequately. Fourteen semi-structured interviews were conducted at province, district, and local schools. These interviews were directed at the staff responsible for implementation of GOL.

3.5.2 Secondary sources of data

Besides interviews, secondary sources of data were gathered from the available research reports and policy documents. These included documents such as budget reports, GDE strategy documents, policies, circulars, and the mid-term review document. Each of these documents was analysed in relation to the primary research questions and the contributions that formed part of the research report.

3.6 Research procedure

The design of the data collection tools was linked to the research purpose and questions determining and identifying factors that affected the implementation of GOL in D11 primary schools. When documents, literature, and other research reports were analysed, the research questions were borne in mind, and related information was noted. Semi-structured interviews formed a large part of the data collection process.

The interview protocol was sent out prior to the actual date of the interview process, and questions were adjusted depending on the respondent's knowledge level. The data collection process took place in May and June. Interviews were initially conducted in schools with educators, followed by principals, then the district, and lastly with the head office. This provided a clear understanding of the factors affecting the implementation of GOL in D11 primary schools. All interviews were recorded on tape and transcribed in full by the interviewer. All respondents were assured of the highest confidentiality.

3.6.1 Formulation of interview questions

The process used in drawing up interview questions followed some key elements as suggested in Booysen's popular five categories of activities (Gunning, 2004: 37):

- All questions needed to be linked to the research problem, purpose, and literature review.
- Various question formats needed to be considered.
- The questions had to have been ordered in such a way as to lead respondents into them and build their confidence with less threatening questions being placed first.

3.6.1.1 The interview protocol

Based on Booysen's five categories of activities, in drawing up the interview questions, the researcher was aware of the sorts of questions to avoid. Questions where there was doubt as to the question's significance and consistency with the objectives of the research were omitted.

In formulating the questions, the researcher had to try to anticipate possible sources of error by making sure that interviewees did not feel inferior by any means possible in answering the questions. Addo argues that should respondents feel inferior, that illustrates the threats to reliability and validity that are present in the survey method (2003). In most interview sessions with the participants, open-ended questions were used. This encouraged respondents to express their opinions more freely. In addition, closed questions were included to get uniformity of responses, which facilitated data input and comparisons among the respondents and made respondents feel free during the process (Gunning, 2004: 38).

The study aimed at identifying factors affecting the successful implementation of GOL in primary education. Possible challenges were identified from literature review and through the failure of many schools to use the ICTs in educating learners. Respondents were asked to indicate how GOL/ICTs were implemented in their schools and to identify key challenges hindering the implementation of GOL.

3.6.1.2 Inviting participation

Respondents were contacted telephonically, and the purpose of interview was clearly explained. Where feasible, an appointment was then made with the interviewee. The researcher obtained permission from the interviewee for any quotations and permission for notes taking. Respondents were made aware of the potential relevance to their field of work of the results of the survey in order to

encourage their participation, bearing in mind that such participation depended on their availability and commitments. I needed to make the respondents feel that agreeing to be interviewed would bring worthwhile and relevant results/information. Respondents were given brief background on the study and its relevance to the respondents' field of work.

3.6.1.3 Piloting the interviews

To check for meaning, clarity, and validity of the interview questions, interviews were piloted. Through the pilot interview process, an analysis was made as to how each question would ultimately contribute to the research. Semi-structured interviews were developed and piloted in four schools before they were administered. The purpose of pilot interviews was to get insight into the relevance of the set of questions. It appeared that some of the interview questions were broad and not relevant to some respondents, for example, "Are computers working in your school or in all the connected schools?". The researcher needed to narrow down this question, as it covered two aspects (working of computers in your school and in all connected schools).

One GDE official who participated in the pilot indicated that the question was irrelevant to him, as he was not responsible for monitoring the project and also that he was not school-based to know whether computers were working in the school. Further, it was realised that the interviews went beyond the allocated time; therefore, some questions were left out during the actual interview process. Lastly, during the pilot, it emerged that some educators and principals had limited information about the project. This resulted in shorter interview time scheduled with them, with much time being spent with GDE officials, and most questions were directed at the officials.

3.6.1.4 Coding data

Prior to coding, the study looked at the quality of the responses to the questions. A review of all interview notes was necessary for quality of completion and completeness. In addition to giving useful information about the responses, this part of the analysis indicated how to analyse the data further and also highlighted any potential data entry errors.

3.7 Data analysis

There are a number of useful techniques in order to analyse the research. This view is supported by Seery that all the notes should be reviewed and tapes or videotapes be transcribed, synthesised, and dissected, while at the same time making sense of the holistic sense of the case being studied (2004: 45). The researcher conducted the editing, coding, transcription, and verification of the qualitative data collected. Data was analysed and edited directly during and after the interviews. It involved reviewing of interviews and going through data sourced from the Internet searches, books, articles, and bibliographies related to the topic at hand. Fourteen interviews were merged, and answers to the questions from all respondents were grouped around particular themes. Data collected was scrutinised and organised into categories so that it could be analysed to identify recurring themes, broad patterns, linkages, and relationships and to get a sense of the information it its entirety. This was based on the grounded theoretical proposition that informed the study to build an explanation of the enabling factors for successful implementation of the Gauteng Online initiative in order to make sense of and address the most significant aspects of the project.

The study then began to consider how many times similar issues had been raised by different respondents, and the most common trends and themes were highlighted. The themes were later drawn together to form an overall relationship. Data was analysed during the data collection process by picking

information relevant to research questions. Where possible, different categories were also further broken down and tabulated across office-based and school-based levels to monitor how similar trends were at different levels. The categorised data was organised into a system that was predominantly derived from the data, which implied that the analysis was inductive and reflected the respondents' perceptions.

3.7.1 Data verification

The findings from the questionnaires and interviews were discussed with the respondents and agreed on. Statements, comments, and suggestions made by the respondents were evaluated and assessed according to the capacity level of the respondents. Additional insights on the interpretation of results and comments from the interviews were used as part of the discussion, and where appropriate, comments were quoted word for word. Each quotation was attributed to the relevant respondent, and where more than one respondent had similar views, all sources were quoted.

3.8 Interpretation of data

The literature review was significant to provide a theoretical context in which the data could be interpreted. It provided an insight into hindering and enabling factors that affected the implementation of ICTs in education. Further, the GOL implementation strategy document and other relevant documents were reviewed in order to establish how to interpret the data and present reliable solutions.

3.9 Significance of the study

This is a small-scale, exploratory study, focusing only on D11 primary schools; therefore, the findings of the research report cannot be generalised. However, it does identify issues that other researchers might find interesting for further research. While the significance of the ICTs in primary schools cannot be

disputed, the challenges faced by many primary schools inhibit the effective/proper use of these ICTs to benefit learners and educators and achieve the set objectives of the Education Department. Given all the aforesaid challenges faced by the D11 primary schools, this study presents the best models that might provide enablers for successful implementation of ICTs in primary schools. It suggests the way forward and identifies other areas for further research. Further, this study assesses the progress made by the Department in connecting schools with ICTs. The results of the assessment imply that there is more work ahead in order to ensure the successful use of ICTs in schools. This study assumes that if identified issues are dealt with, GOL and other ICT projects will achieve great success.

3.10 Limitations of the study

During the time of completing this study, the researcher was employed as an educator at one of the D11 primary schools (Regents Park Primary School); therefore, the information gathered might be skewed in order to represent the perceptions of the educators. The district officials assisted the researcher to secure interviews with the participants; however, a great deal of care was taken to ensure that this study remained objective as far as possible. Selection was influenced by the availability of participants.

The sample size was limited to six schools, targeting two educators and a principal from each school and two GDE officials. In total, the targeted number of respondents was 20 respondents. This was reduced to 14 respondents, as two schools opted out. There was a likelihood that the respondents' views could be skewed towards their school contexts. Therefore, the findings cannot be generalised to similar studies.

Lastly, this study did not consider community and learner perceptions and attitudes towards ICTs in their schools, and the study also did not focus on the impact of ICTs on learning and teaching beyond what is reported.

4 Presentation of the research findings

4.1 Introduction

The thrust of this chapter is the presentation of the key findings based on the objectives set for the study, the problem statement, and the research questions that were outlined in Chapter 3. The findings were noted from the semi-structured interviews conducted. Data collected was scrutinised and organised into categories so that it could be analysed to identify recurring themes, broad patterns, linkages, and relationships and to get a sense of the information in its entirety. Identification of key themes and words, which came out through the process of data gathering, created a sense of how cost, technical support, access, capacity, training and development, safety and security, and leadership and planning influenced and affected the implementation of ICT projects such as GOL. The main methodology of this study was semi-structured interviews. Observations were made, and they provided some insight into certain aspects of this research topic. Tables, figures, and descriptions of data will be used to present the findings.

4.2 Profile of the schools surveyed

Six schools were chosen to form part of this study. However, two schools withdrew from the interview process. Their principals gave varying reasons: in school E, the principal complained about time constraints, since school E was busy with a “recovery plan” as a result of the public servants’ strike, which lasted for a month in May and June 2007. In school F, the computer laboratory had not been used by either learners or educators since the departure of the two super-users due to promotion and redeployment. The data for this study was collected from four schools, which were drawn from a pool of four hundred and fifty schools connected to GOL. According to the information provided by one GDE respondent, the schools that formed part of the study had received GOL during

the 2003/2004 financial year during the first roll-out. This section provides detailed background on the schools surveyed in this study. It is important to note that this section is based on the observations made by the researcher. The schools were categorised according to their classification and were given special names in an effort to protect their identity. The table below presents a summary of the schools profile.

4.2.1.1Table: Schools profile

School name	Characteristics or category	Demographics	Number
A. Zamani Primary School	• Township school in Soweto • Public school • Previously disadvantaged school	Learners Computers Classroom Educators HOD Principal Deputy Secretary Office Staffroom Storeroom Library	320 27 13 10 2 1 1 1 1 1 1 0
B. Zakfiri Primary School	• Previously disadvantaged school • Suburb school in Lenasia	Learners Computers Classroom Educators HOD Secretary Office Principal Deputy Staffroom Storeroom	700 32 16 17 4 2 2 1 1 1 1

School name	Characteristics or category	Demographics	Number
		Library	1
		Strongroom	1
C. Chillis Primary School	Former Model C school in Johannesburg South	Learners	680
		Computers	27
		Classroom	19
		Educators	16
		HOD	3
		Secretary	2
		Office	2
		Principal	1
		Deputy	1
		Staffroom	1
		Storeroom	1
		Library	1
		Strongroom	1
D. Ulwazi Primary School	Township school in Soweto	Learners	420
		Computers	26
		Classroom	13
		Educators	14
		HOD	1
		Secretary	1
		Office	1
		Principal	1
		Deputy	1
		Staffroom	1
		Storeroom	1
		Library	0
		Strongroom	0

Comparatively, it was noted that two schools had the highest number of learners: Zakfiri Primary School with 700 learners and Chillis Primary School with 680 learners. The school with the least number of learners was Zamani Primary School with only 320 learners. The imbalance in the number of learners found in

schools was attributed to the fact that Zakfiri and Chillis Primary Schools were located in suburb areas, whereas the two other schools were located in Soweto. One respondent mentioned that the vast majority of learners migrated from township schools to schools in towns and suburb schools, mainly former Model C schools. The school size(s) influenced the financial stability of the schools. Schools with the highest number of learners collected more school fees and received a substantial subsidy from the GDE compared to schools with fewer learners.

All schools had more than 10 classrooms, one computer laboratory, and more than 25 computers. Zakfiri had the highest number of computers with 32 computers. Two of these computers were used by the two secretaries, one by the principal, four were placed in the library/media centre, and 25 were placed in the computer laboratory (GOL). In Chillis, there were 27 computers: two computers were used in the office, whereas the rest of the computers were in the computer laboratory. In both Ulwazi and Zamani, one computer was placed in the office, and the rest were in the computer laboratory. It was observed that Zakfiri Primary School and Chillis Primary School had the highest number of other ICT gadgets and other elements such as a staffroom and strongroom.

In general, it was observed that all the schools were properly managed, and the environment was conducive to learning and teaching. To ensure school safety, there were security personnel at the gates, opening and locking the gates all the time. The general appearance of all the schools was good, and garden areas and fields were well maintained and looked after. Lastly, computer laboratories were in good condition, and there was no evidence of vandalism.

4.3 Profile of the respondents

A total of 14 respondents were interviewed for the study through one-on-one semi-structured interviews. The interviews lasted between one hour and one

hour 40 minutes. The key discussion points and common themes highlighted during the interviews were recorded, summarised, and evaluated as described in the research methodology. These are presented in relation to the sub-problems and the research questions. This section presents a brief profile of the respondents.

4.3.1.1Table: Profile of the respondents

Respondents' place of work	Job level or capacity	Formal qualification	Years of working experience
GDE Officer	GOL Project Director	PhD	33
GDE Officer	DCES E-Learning Unit	Honours	26
Zamani Primary School	Principal	Diploma	25
Zamani Primary School	Super-users	Diploma	18
Zamani Primary School	Computer facilitator	Diploma	2
Zakfiri Primary School	Principal	Master's degree	29
Zakfiri Primary School	Educator	Diploma	17
Zakfiri Primary School	Educator	Diploma	6
Chillis Primary School	Principal	Degree	22
Chillis Primary School	Super-user	Diploma	6
Chillis Primary School	Super-user	Diploma	8
Ulwazi Primary School	Principal	Diploma	20
Ulwazi Primary School	Super-user	Diploma	8
Ulwazi Primary School	Educator	Diploma	9

It was noted that both GDE respondents had the highest qualifications: one with a PhD and the other with an honours degree. The principal from Zakfiri was among the highest qualified respondents with a master's degree. Other respondents had diplomas as their highest qualifications. In general, the experience of the respondents in senior positions ranged from 20 to 33 years of working experience, while the rest of the respondents had two to 18 years of working experience. All respondents' background was in education.

The comments below will assist in identifying and understanding factors affecting the implementation of GOL in schools as noted by the interviewees.

4.4 Background information and qualifications of the respondents

The responses varied considerably, which formed the basis for analysing the respondents' exposure to ICT and the understanding of GDE transformational strategies. The researcher expected varying responses due to the location of the schools and the diverse backgrounds of the respondents. Common themes that frequently emerged from the respondents are presented in the table below.

4.4.1 Table 4.3: Respondents' background information

Questions	Characteristics	Number of respondents	Percentage (100%)
How long have you been working for the GDE?	30-40 years	1	7%
	20-30 years	4	29%
	10-20 years	3	21%
	0-10 years	6	43%
What is your position?	GOL Director	1	7%
	DCES E-learning	1	7%
	Principal	4	29%
	Educators	8	57%
What is your background?	Education	14	100%
What qualifications do you have?	PhD	1	7%
	Master's degree	1	7%
	Honours degree	2	14%
	Diploma	10	71%
Do you have any formal qualification(s) in ICTs?	Yes	2	14%
	No	12	86%
What level of qualifications do you have?	Computer literacy certificate	2	14%
Are those qualifications assisting	Most of the time	2	14%

Questions	Characteristics	Number of respondents	Percentage (100%)
you in the implementation of GOL?			

Eight respondents had worked for the Department of Education for more than ten years, and six of them had worked for the GDE for more than six years. It emerged that all the respondents were professionally qualified with varying qualifications:

- One with a PhD
- One with a master's degree
- One with an honours degree
- Eleven of them with diplomas

Only two respondents had an ICT-related qualification, and 12 of them did not have ICT-related qualifications. It was indicated by the two respondents that their ICT certificates assisted them in using GOL. However, 12 respondents (principals and educators) attended the 16 hours of GOL training that had been organised by the GDE.

4.5 Introduction and use of GOL

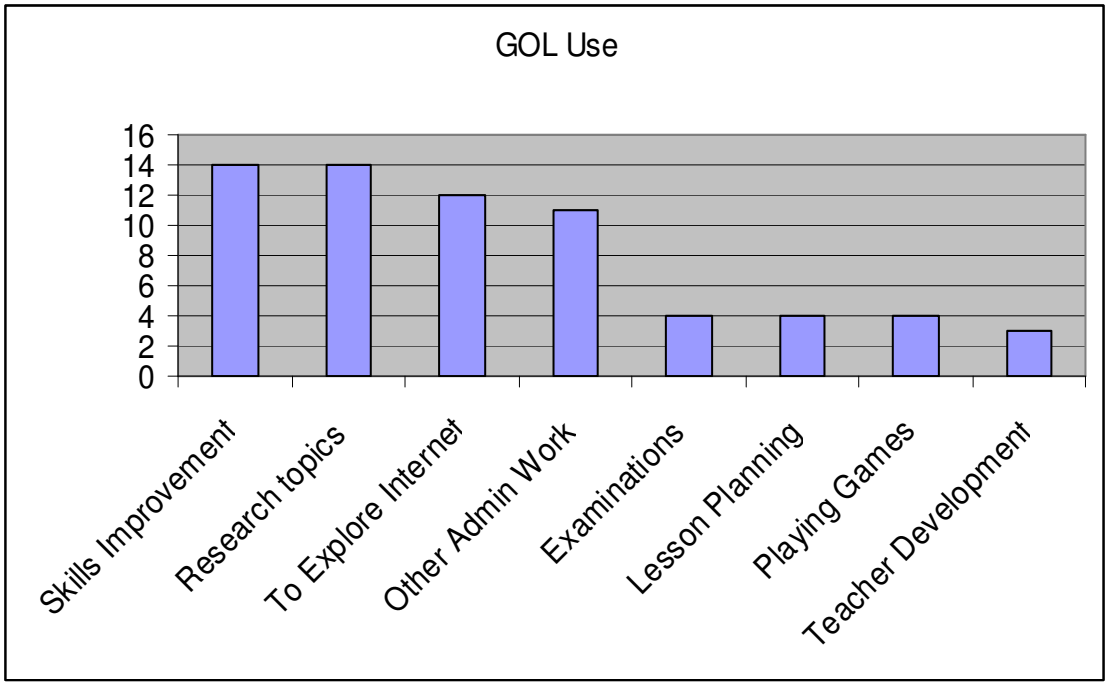
All surveyed schools had received GOL during the 2003/2004 financial year during the first roll-out. It was observed that respondents were happy with the introduction of the GOL project. This emerged from various comments made by the respondents about GOL use. However, it was clear that respondents were not certain about the sustainability of the project; their main concerns were around maintenance and lack of support. Nevertheless, all respondents believed that GOL played a tremendous role in transforming the education system and equipping users with the necessary computer skills. Common themes that were raised by the respondents around the use of GOL are presented in the table below.

4.5.1 Table: Common themes about GOL introduction and usage

Questions	Common themes	Number of respondents	Percentage (100%)
For how long has your school been connected to GOL?	Since 2003/2004	14	100%
Are all the computers working?	Switching on and off	11	79%
Why, or why not?	Broken	5	20%
Who uses them?	Learners	14	100%
	Educators	8	57%
	Community	6	43%
	Super-users	6	43%
What do you use these computers for?	Skills improvement	14	100%
	Research topics	14	100%
	To explore Internet	12	86%
	Other admin work	11	79%
	Examinations	4	29%
	Lesson planning	4	29%
	Playing games	4	29%
	Teacher development	3	21%
How often are these computers used?	Two times a week	6	43%
	During computer periods	6	43%
	Daily	2	14%
Is GOL accessible to all educators?	Yes	11	79%
	No	3	21%
Do educators have skills and knowledge of using ICTs?	Not all of them	8	57%
	Basic skills	6	43%
Who looks after the computer laboratory(ies)?	School security	10	71%
	Super-users	2	14%
	School principals	2	14%
Does he/she allow everyone to have access to use the laboratory/ICTs?	Yes	9	64%
	Only super-users	3	21%
	Not sure	2	14%

Questions	Common themes	Number of respondents	Percentage (100%)
For how long is the laboratory accessibly?	During school time All the time	12 2	86% 14%

4.5.2 Figure: GOL use



Three schools reported that 100% of their computers were in good working condition, whereas one school reported that 20% of the computers were broken. The responses about the use of GOL were more distinctive in terms of consensus, with 100% of the respondents highlighting learners and educators as the main users of GOL. In addition, these respondents commented that GOL was used to improve computer skills and to research topics. In general, respondents indicated that computers were used for stimulating the IT industry by exposing users to the benefits of using computers and the Internet. The literature suggested that ICTs were used for accessing, storing, collecting, retrieving, processing, manipulating, and transmitting and presenting information (Cyber law, nd: 1). Conversely, 86% of the respondents expressed that they

used GOL to explore the Internet and for various other things. One respondent commented that:

> *Computers are used for various other things depending on the teacher's level of competency.*

This view was supported by comments made by eleven respondents (79%) who commented that learners used GOL to play computer games, and 29% of the respondents mentioned other uses of GOL. These respondents stated that GOL was used for activities such as lesson planning, writing assignments or projects, playing games, self-training, administration work, schedules, class lists, storing information, developing certificates, learner progress reports, job searches, Internet exploration, private businesses, and social connections. It is worth noting that, in one school, respondents mentioned that the community used computers as one of the community development strategies to equip community members with adequate computer skills in order to enter the job market. This view was commended and supported by the two GDE officials who felt that such initiatives assisted in achieving the GOL objective of stimulating the IT industry.

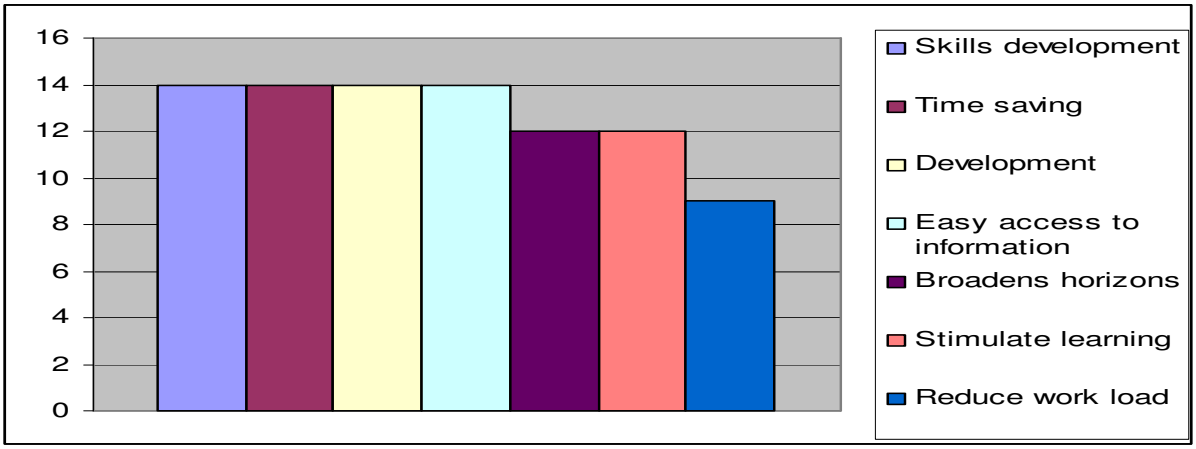
4.6 Enabling factors

Given the nature of the GOL project, respondents were sceptical about responding to questions around this sub-problem. This emerged from the fact that GOL was not integrated in the curriculum; instead, it was mainly used to improve computer skills. Further, it was due to the fact that role players noted crucial challenges that faced the project. This resulted in respondents giving hypothetical responses about what they thought were GOL enablers. The table and the graph below present a summary of the key factors as they were raised by the respondents.

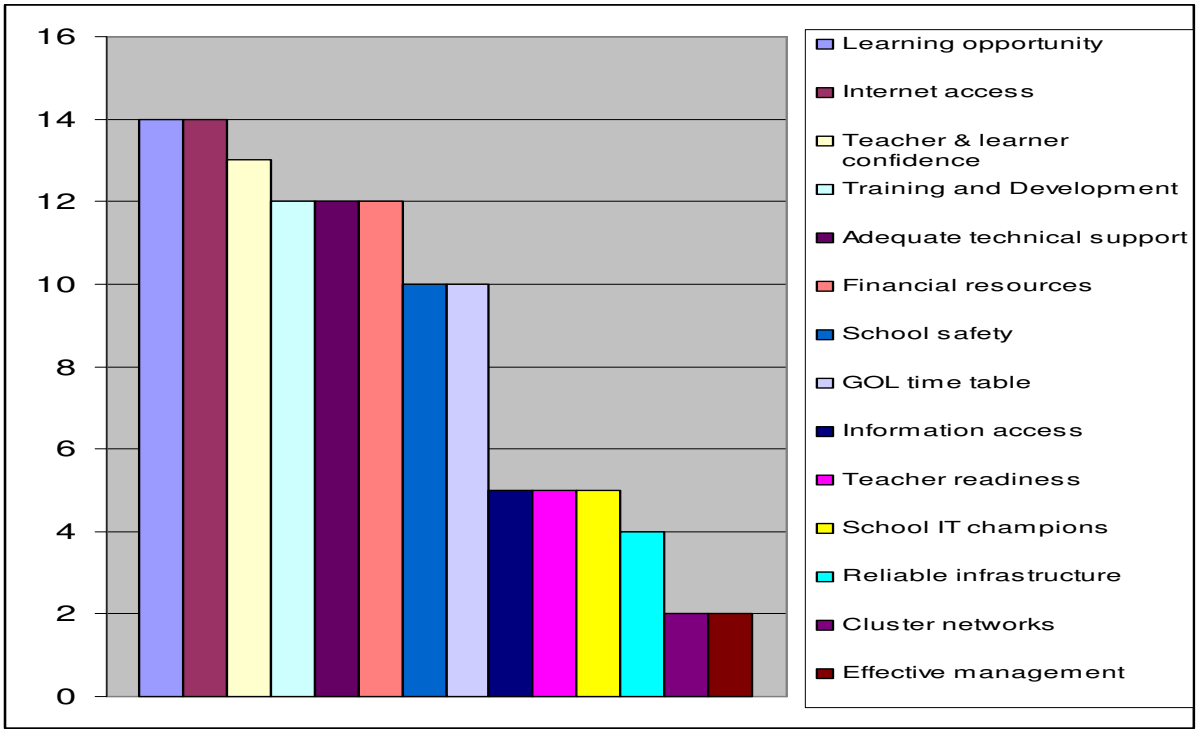
4.6.1 Table: Enabling factors

Questions	Common themes	Number of respondents	Percentage
What contributes to the effective and efficient use of GOL in your school?	Learning opportunity	14	100%
	Internet access	14	100%
	Teacher and learner confidence	13	93%
	Training and development	12	86%
	Adequate technical support	12	86%
	Financial resources	12	86%
	School safety	10	71%
	GOL timetable	10	71%
	Information access	5	36%
	Teacher readiness	5	36%
	School IT champions	5	36%
	Reliable infrastructure	4	29%
	Cluster networks	2	14%
	Effective management	2	14%
Which element(s) contribute(s) the most?	Internet access	14	100%
	Safety and security	14	100%
	Training and development	13	93%
	Technical support	13	93%
	Adequate resources	12	86%
	Positive attitude	10	71%
	Effective management	9	64%
	Learning opportunity	8	57%
What are the benefits of using computers in education?	Skills development	14	100%
	Time saving	14	100%
	Development	14	100%
	Easy access to information	14	100%
	Broadens horizons	12	86%
	Stimulates learning	12	86%
	Reduces workload	9	64%

4.6.2 Figure: Benefits of using GOL



4.6.3 Figure: Enabling factors



All respondents mentioned Internet access and learning opportunities as the main enablers for effective use of GOL. More than 85% of the respondents mentioned financial resources, adequate technical support, and training and development as the significant enablers for effective implementation of GOL.

There was also concern around security; this was raised by more than 70% of the respondents. More than 57% of the respondents further highlighted self-motivation, eagerness, and educational software programs as other significant enablers. These factors (educator perception, interest, and adequate educational software material) were also observed by Stark. Teachers' interest emanated from the fact that most teachers were interested in learning and improving their computer skills. One educator commented:

> *I like to work on the computer because I learn new things every time.*

It must be mentioned that both GDE officials mentioned adequate infrastructure, cluster networks, and effective management as other significant enablers for effective implementation of GOL. The argument was that these factors supported the primary factors. In general, respondents emphasised the following list of factors as the main contributing enablers:

- Internet access
- Adequate resources
- Safety and security
- Effective management
- Technical support
- Training and development
- Learning opportunity
- Motivation
- Positive attitude

Further, it must be noted that all respondents mentioned skills development, time saving, workload reduction, exposure, development, and easy access to information as the main benefits of using computers in education.

4.7 Hindering factors

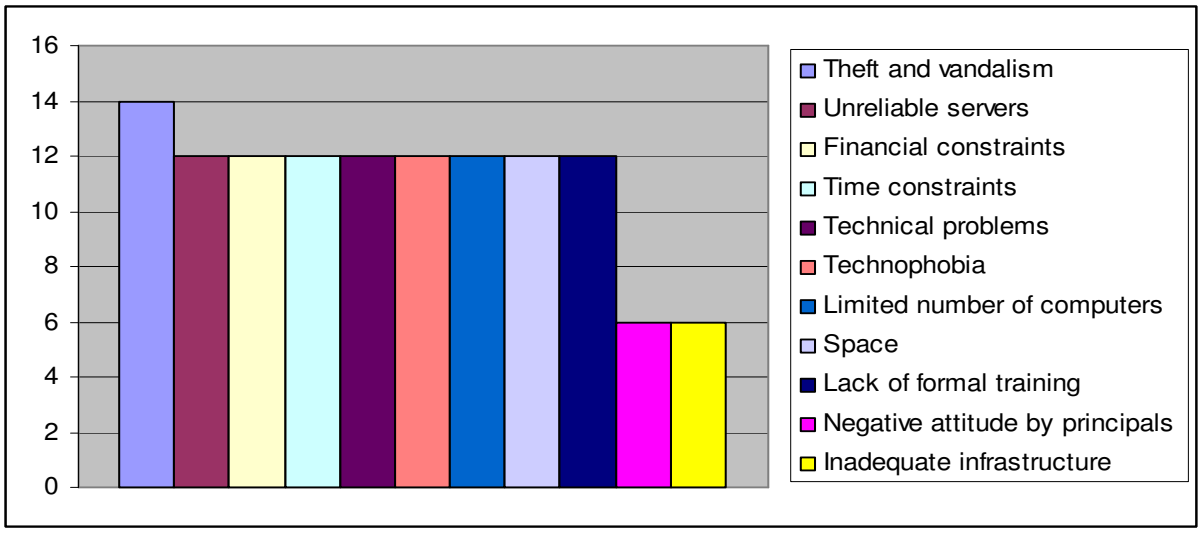
It must be mentioned that some of the hindering factors raised by the respondents were biased towards the respondent's line function and place of work. It appeared that there were many more challenges than enabling factors. The table below presents a summary of the common themes as they were raised by the respondents.

4.7.1 Table: Common themes about the hindering factors

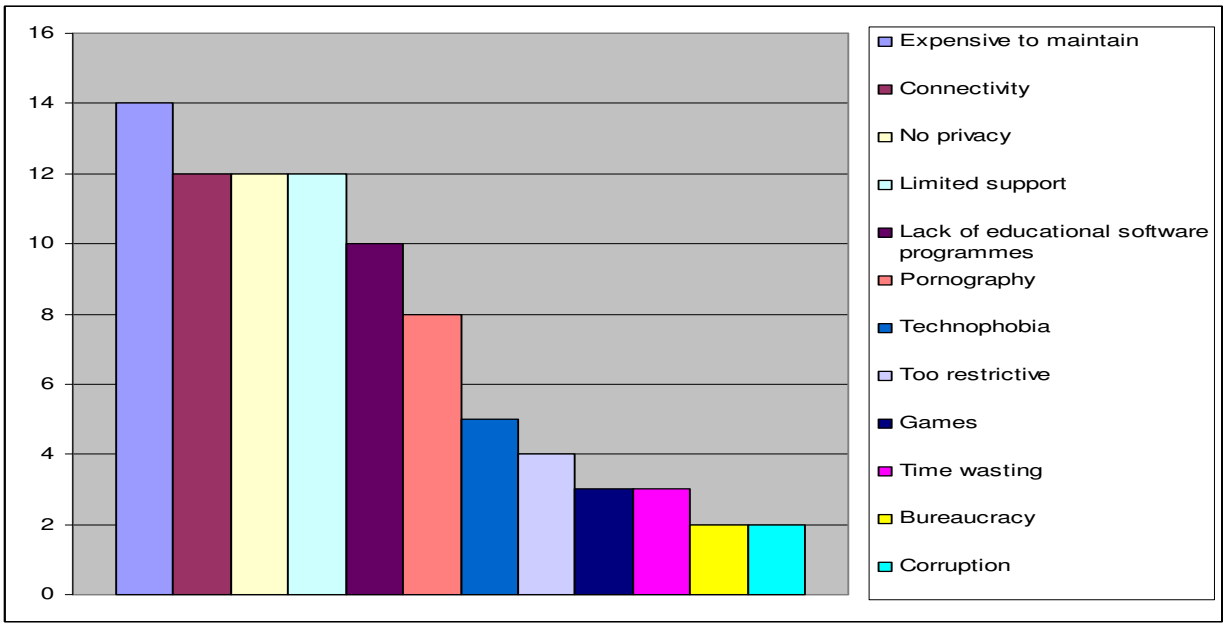
Questions	Common themes	Number of respondents	Percentage (100%)
What hinders the use of GOL/computers in schools?	Theft and vandalism	14	100%
	Unreliable servers	12	86%
	Financial constraints	12	86%
	Time constraints	12	86%
	Technical problems	12	86%
	Technophobia	12	86%
	Limited number of computers	12	86%
	Space	12	86%
	Lack of ICT formal training	12	86%
	Negative attitude of principals	6	43%
	Inadequate infrastructure	2	14%
Are there any other challenges or barriers that inhibit the use of the computers?	Poor curriculum integration	14	100%
	Lack of effective policies	12	86%
	Learners' background	9	64%
	Lack of leadership	4	29%
How do you deal with these challenges?	Peer learning	8	57%
	Sharing	8	57%
	Advanced training programmes	6	43%
	GOL policy	6	43%
	Communication	5	36%

Questions	Common themes	Number of respondents	Percentage (100%)
	Timetables	5	36%
	Workshops and seminars	2	14%
	Enforce accountability	2	14%
	Support	2	14%
	Cluster network	2	14%
What are the limitations of using GOL?	Expensive to maintain	14	100%
	Connectivity	12	86%
	No privacy	12	86%
	Limited support	12	86%
	Lack of educational software programs	10	71%
	Pornography	8	57%
	Technophobia	5	36%
	Too restrictive	4	29%
	Games	3	21%
	Time wasting	3	21%
	Bureaucracy	2	14%
	Corruption	2	14%

4.7.2 Figure: Hindering factors



4.7.3 Figure: GOL limitations



It is worth mentioning that the hindering factors mentioned by school-based respondents were common to all the surveyed schools and were also relevant to the hindering factors identified in the literature review section. These were as follows:

- Inadequate Internet access
- Costs
- Time constraints
- Technical problems
- Limited number of computers
- Space

The lack of technical support resulted in Zakfiri contracting a private company to provide technical support. The principal of the school commented:

> *If it was not for the reliable technician that we have contracted, computers in my school would all be down and unused …. The guy is very helpful and flexible, he is*

available to come and fix our problems whenever we want him to.

Conversely, both GDE officials mentioned technophobia, negative attitude of some school principals and educators, theft and vandalism, and inadequate infrastructure as the main hindering factors. Nonetheless, GDE officials welcomed the list of factors as raised by school-based respondents. In addition, 100% of the respondents identified poor integration of GOL with the curriculum as a secondary hindering factor, whereas school-based respondents further mentioned lack of effective policies and leadership as other secondary factors.

It was observed that a variety of strategies were used to deal with the challenges. These strategies were influenced by the line function of the respondents. Only 14% of the respondents mentioned accountability, support workshops and seminars, e-learning policy, and establishment of cluster networks as significant means of addressing the challenges, whereas 29% of the respondents mentioned school-level support and advanced training programmes as other ways of dealing with the challenges. Sharing and teamwork were mentioned by 86% of the respondents as the only ways to deal with the learner-computer ratio. Educators mentioned that they always encouraged learners to share and work with their peers.

In responding to the question about limitations, responses varied. Time wasting and lack of educational programs were raised by 29% of the respondents, mainly the principals. The concern was about the amount of time educators and learners spent in the computer laboratories. Other limitations that were raised by all the respondents were connectivity, costs, lack of privacy, and pornography. Two other significant factors that were mentioned by one GDE official were corruption and bureaucracy. The respondent mentioned that:

In most cases principals and super-users deliberately forget to lock the computer laboratories, thus leading to theft and vandalism. In addition, there is too much red

tape within GOL project, schools are not allowed to use other educational software programs. When schools report broken or stolen computers, they must first log a call through the call centre. Then the case will be forwarded to the suppliers or vendors, which in most cases becomes a tedious process to follow.

4.8 Leadership and support

Questions around this sub-problem were set to assess the role of the school leadership in ensuring the maximum use of GOL and, further, to assess the effectiveness of support provided by the GDE and contracted vendors. It was mentioned by more than 86% that technical problems and lack of leadership were crucial hindering factors that affected GOL. The table below presents a summary of the common themes as mentioned by the respondents.

4.8.1 Table: Leadership and support

Questions	Common themes	Number of respondents	Percentage (100%)
How do you plan for the implementation of GOL? Who leads the planning process?	SMT duty	10	71%
	Through timetables	6	43%
	Role of super-users	4	29%
	Through teams	3	21%
	Guided by GOL policy	2	14%
Is there adequate technical support provided? Who provides the support?	Limited support	12	86%
	Private technical company	3	21%
	Yes, by vendors	2	14%
Does this impact on your ability to work in the project? Is it good or bad?	Long process	14	100%
	Negative	12	86%
	Unreliable	12	86%
	Slow	2	14%

Questions	Common themes	Number of respondents	Percentage (100%)
Do GOL-connected schools get other support from senior management?	No	8	57%
	Provide advanced training	2	14%
	Endorse and approve certificates	2	14%
	Develop manuals	2	14%
How does this support assist in integrating GOL with learning and teaching?	No	8	57%
	Lesson planning	2	14%
	Research	2	14%
	Skills improvement	2	14%
Does the support assist in training and developing educators and learners in GOL-connected schools?	No	12	86%
	Opportunities	2	14%

It was noted that all schools developed and adopted a GOL timetable. The timetable was mainly the responsibility of the school management team (SMT). Therefore, 71% of the respondents mentioned that planning for GOL use was done by the SMT. According to the views of 29% of the respondents, computer laboratories were the responsibility of the super-users, as they were the only ones who were given secret codes for entering and exiting the laboratories. It was observed in most schools that planning for GOL use was done at school level and through cluster networks/teams.

It must be noted that technical support provided to schools was very limited. This view was supported by more than 86% of the respondents, mainly school-based respondents. The lack of technical support resulted in one school contracting a private IT company. This view was mentioned by three respondents from the same school. Fourteen per cent of the respondents (GDE officials) claimed that there were mechanisms in place to support schools. In their view, schools were reluctant to ask for support because of the processes, procedures, and protocol

that had to be followed in seeking that support. All respondents agreed that schools were negatively affected by the lack of technical support. This emerged from comments made by 86% of the respondents that GDE support was very slow and unreliable, thus resulting in low use of GOL.

4.9 Experience of using GOL

Questions for this sub-problem were set to gain an understanding of the experience and perceptions of the respondents about GOL. Generally, there were mixed feelings about the GOL project. This view was supported by the views mentioned by the respondents. The table below summarises these views.

4.9.1 Table: Experience of using GOL

Questions	Common themes	Number of respondents	Percentage (100%)
How would you describe the experience of using GOL since its connection?	Mixed feelings	8	57%
	Interesting	7	50%
	Waste of time	6	43%
	Eye opening	5	36%
	Challenging, difficult	2	14%
What would you say is the most important factor that leads to the effective use of GOL or that negatively affects GOL?	**Positives:**		
	Support	2	14%
	Interests	5	36%
	Motivation	9	64%
	Internet access	14	100%
	Negatives:		
	Theft and vandalism	10	71%
	Lack of resources	12	86%
	Unreliable Internet access	12	86%
	Lack of technical support	12	86%
	Limited number of	12	86%

Questions	Common themes	Number of respondents	Percentage (100%)
	computers		
Are there any other factors that we have not talked about that you think affect the implementation of GOL?	Prioritisation	1	7%
	Security	1	7%
	Specialised training	1	7%
	Perceptions	2	14%
	Transparency	4	29%
	Integration	12	86%

Respondents provided negative and positive responses. This supports the comment made earlier that respondents had mixed feelings about GOL. Eight respondents (57%) commented that it was interesting and eye-opening to be involved in an empowering initiative such as GOL. According to them, GOL had helped many users to improve their computer skills. However, they acknowledged the challenges with which GOL was faced. Conversely, 43% of the respondents, mainly those in senior positions, commented that GOL had been challenging and difficult. It is worth noting one of the comments made by seven educators (50%) that GOL had been a waste of money and time. One educator commented that:

> *The department should have used the money to increase teacher salaries than to waste it on 25 computers of which are not integrated to the curriculum.*

All respondents mentioned Internet access as the main positive element that allowed the effective use of GOL. The other positive factors that were raised by a varying number of the respondents were motivation, interests, and support. More than 86% of the respondents mentioned the following negative factors: lack of adequate financial resources, theft and vandalism, unreliable Internet servers, lack of technical support, and a limited number of computers. These, in their view, were the main challenging factors that had to be addressed in order to ensure proper use of GOL.

4.10 Conclusion

The views shared by the respondents provide a wide range of observations and suggestions. While there are positive comments raised by the respondents about the factors affecting the use of ICTs in education, there is also a fair amount of information given on the weaknesses and challenges that exist in GOL. The remarks made by the respondents and the manner in which these were raised lend credibility to the objectives and constructive inputs that reinforce the reliability of the research data.

5 Interpretation of the results

5.1 Introduction

Generally data analysis viewed as one of the most important and probably one of the most neglected parts of the research study. This is supported by Silverman who believes that analysis is a pervasive process throughout the life of the research project (2003: 119). It is from this premise that this chapter provides a detailed analysis of the results in relation to those raised by various authors in the literature review section. Interpretation entails an analysis of relevant literature and surveyed data, based on the research questions that underpin the study. The questions, which are outlined in Chapter 3, are as follows:

1. What are the factors affecting the implementation of GOL in primary schools?

This main research question necessitates the following sub-questions:

- Which factors contribute to the successful implementation of the GOL project?
- Which factors hinder successful implementation of the GOL project?

The previous chapter presented the findings of the study. These findings revealed the enabling and hindering factors that affected the implementation of GOL. Therefore, this chapter is aimed at assessing whether GOL has been a success or a failure. A criterion for this assessment is established and discussed in the following sections. The criterion is influenced by the views raised by various ICT scholars and the respondents.

5.2 What are the factors affecting the implementation of GOL?

5.2.1 Respondents' background and training

The findings of this study revealed that all respondents had varying professional qualifications, from a diploma to a PhD. Only two respondents had formal ICT qualifications. Most respondents did not have a formal ICT qualification beyond the 16 hours of training that was organised by the GDE. The two respondents with ICT-related qualifications expressed the significance of their qualifications in implementing GOL. The aspect of formal ICT qualifications or training was found to be impacting on GOL use. Addo (2003), Friedberg (1992), and Scrimshaw (2004) highlight the significance of formal ICT training for successful use of ICT in education. One significant suggestion that this study has made is the need for advanced formal ICT training.

The lack of formal training results in poor understanding of ICT terminology. The school-based respondents constantly confused GOL/ICTs with computer studies and/or e-learning. The lack of understanding was further reflected in areas such as the meaning of ICTs, the purpose and objectives of GOL, the benefits of using GOL, and the integration of GOL with the curriculum. The lack of substance in the responses of the respondents suggested a need for formal ICT training and workshops in the entire district. The lack of training suggests that educators will have to familiarise themselves with technology before settling down to integrate GOL with the curriculum.

5.2.2 Introduction and use of GOL

It was found that most schools were not aware of the origins and objectives of GOL as discussed in Chapter 1. Respondents viewed the introduction of GOL as haphazard and quick. Most schools in D11 had received GOL during the first phase of the roll-out (the 2003/2004 financial year), thus making it more than three years. This creates technical problems with the computers, since it is understood that the general lifespan of a computer is three years. After three

years, the software must be upgraded or changed. None of the respondents mentioned that GOL in their schools had been upgraded or changed. The significance of maintenance and upgrading of computers is observed by scholars such as Addo (2003) and Quinn (2005). Addo argues that information infrastructures (ICT) require constant maintenance and frequent upgrading. This study found that the lack of maintenance and upgrading resulted in Zamani reporting that 20% of their computers were broken. The lack of GOL maintenance and upgrading was attributed to the fact that the GDE was still busy with the roll-out.

It was also found that GOL was used by learners and educators for various activities. This supported the predictions made by Friedberg that, in most schools, learners use computers for playing games, doing assignments, research, and other activities (1992: 17). However, this study observed that GOL quality of use was general low, especially in the township schools, whereas in the suburb schools, it was high. This observation supports the assertion made elsewhere in this study that school category/classification and location had an impact on the implementation of GOL. It would be useful to look at the table below, which presents a summary of GOL quality use.

5.2.3 Table: GOL quality use

Activity	Chillis	Ulwazi	Zamani	Zakfiri
Developing of learning programmes	×	×	×	✓
Lesson planning	✓	×	×	✓
Tests and assignments	✓	✓	✓	✓
To research topics	✓	×	×	✓
Other administration work	✓	✓	✓	✓
For skills development	✓	✓	✓	✓
To explore the Internet	×	×	×	✓
For teacher and school development	✓	×	×	✓
To play games	✓	✓	✓	✓

Activity	Chillis	Ulwazi	Zamani	Zakfiri
For record keeping	✓	✓	✓	✓
Teaching and learning	×	×	×	×
Total number of factors per school	**✓=8** **×=3**	**✓=5** **×=6**	**✓=5** **×=6**	**✓=10** **×=1**

It emerged that, in some schools, GOL was not used for all the identified uses. Zakfiri emerged as a leader in the implementation of GOL. They used GOL for almost all the highlighted activities, except for teaching and learning. One could assume that their success in using GOL could be linked to their having the highest number of computers (Table 4.1). Nonetheless, they appeared to be experiencing problems with integrating GOL with the curriculum. Chillis emerged as the second leader in using GOL, with eight activities for which they used GOL. This could be attributed to the lack of technical support. Ulwazi and Zamani emerged as the lowest GOL users with less than six activities. About 20% of Ulwazi computers were reported broken; therefore, it was suspected that this might have caused the low use of GOL in that school. The varying GOL use can be attributed to the following elements: school location, socio-economic factors of the school community, exposure, and background of the users.

This study also observed that there was a gap between learners and teachers in terms of ICT understanding. In Zakfiri, it was observed that there were learners with the highest knowledge of computers. Such learners were used to teach their fellow classmates. This could be attributed to the role of the community in terms of exposing learners to the ICTs. In some school communities, it was observed that there were local Internet cafés around the school. This supported Addo's predictions that learners who used computers at their homes and in their communities found it easy to cope with ICTs at schools (2003: 35). Also, Scrimshaw argues that, in a situation where communities are involved, it becomes easy to effectively use ICTs in education (2004: 6). However, this study observed low community involvement. GDE officials attributed this to the negative attitude(s) of some principals. This view supported the assertion made

by Addo that the involvement and perceptions of education role players influenced the uptake of ICTs in education (2003: 36).

Lastly, even though schools reported varying use of GOL, some principals were concerned about the amount of time classes spent in the computer laboratories. At Zakfiri, the principal reported that sometimes educators used GOL to do their personal or private things. This prompted school management teams to develop and adopt a GOL access policy and timetable. In one school, the computer laboratory was restricted to the principal and the super-users only.

5.3 What contributed to GOL's success or failure?

The highlighted GOL uses indicated that the leading schools had more enablers and fewer barriers. However, it was found that, generally, the majority of the schools were experiencing more challenges. To assess and analyse why only two schools appeared to be succeeding in implementing GOL, a comparison between the enablers and barriers was drawn up. A reference is made to Tables 4.5 and 4.6 and Tables 5.2 and 5.3 (in the appendix section). The school that enjoyed the highest number of enablers was Zakfiri, followed by Chillis. This resulted in both schools emerging as the highest GOL users (Table 5.1). It was observed that more enablers and fewer barriers indicated GOL success, whereas fewer enablers and more barriers implied GOL failure. Therefore, a conclusion was drawn that Ulwazi and Zamani were failing in the implementation of GOL. The following section provides a detailed discussion of the impact of the identified factors.

5.3.1 Enablers

GOL is one of the transformational flagship ICT projects of the GDE. The focus was mainly to provide ICTs to the previously disadvantaged schools. Also, it was introduced to stimulate the IT industry. Therefore, the project needed close supervision in order to ensure success. However, it was found that there were

few factors that contributed positively to the implementation of GOL (Table 4.5). It must be noted that some of these factors were related to the factors predicted by the reviewed literature.

BECTA observed the following enablers: access, availability of financial resources, and adequate technical support (2004: 9). These enablers were supported by other scholars such as Scrimshaw, who also added leadership and planning as other key enablers. Further, Stark concurred with the enablers as raised by the former and the latter scholars (2000: 7). It is noteworthy mentioning that respondents highlighted similar factors. However, this study found that these factors were not common to all the schools. The availability of the factors in a school meant that such a school was succeeding in using GOL, and vice versa. The following section will explore how costs, access, and adequate technical support influenced the utilisation of GOL.

Adequate financial resources (costs): ideally, adequate financial resources result in successful use of ICTs. Financial resources make it easy for schools to afford ICT consumables. It was found that schools with limited budgets were not effectively using GOL. Schools used money from school fees to pay for ICT consumables. The price of school fees varied considerably, thus causing some schools to collect more money than other schools. Zakfiri and Chillis charged more than R300 for school fees. Comparably, Ulwazi and Zamani charged less than R100 for fees. In such schools, costs were minimised, such as that GOL users were not allowed to print their work. Instead, they were encouraged to save their work onto stiffy disks. This resulted in users encountering problems in retrieving their work. In some schools, printers were out of toner/ink. Lastly, almost all the surveyed schools (except Zakfiri) largely relied on the GDE for financial support.

Access and technical support: GDE officials claimed that all schools had access to the Internet. Further, they indicated that there were measures in place

to assist schools with dysfunctional servers. School-based respondents challenged such claims by highlighting that the Internet servers were unreliable. Nonetheless, it was found that there was limited technical support provided to schools. Only schools that could afford to pay for private technical support had functioning servers; therefore, they had access to the Internet.

5.3.2 Barriers

GOL presented a number of challenges (Table 4.6), which, in most cases, could result in GOL failure. Due to the complex nature of these barriers, the classification (internal and external) of factors suggested by the literature was adopted in order to provide a detailed analysis of these factors.

5.3.2.1 Internal barriers

This study observed differences between the barriers mentioned by the school-based respondents and the GDE officials. Schools reported the highest number of barriers. GDE respondents seemed to be aware of the challenges faced by schools, but little was done to assist schools to curb the challenges. The highlighted barriers were similar to those predicated by the literature (Gunawardana, 2005b & BECTA, 2004). The main barriers that were frequently mentioned were financial constraints (costs), dysfunctional servers (lack of access and connectivity), technical problems (lack of technical support), and lack of formal ICT training (Table 4.6). In addition, school-based respondents reported various other internal barriers that were unique to their schools, factors such as time constraints, space, a limited number of computers, technophobia, and the negative attitude of some principals.

One of the crucial findings made by this study was that dysfunctional servers were caused by an error that occurred during the connectivity stage. It was reported that EMS numbers were erroneously swapped, thus making it difficult

for the contracted vendors to supervise the system. The affected schools were mainly those that had received GOL during the first phase of the roll-out.

The study also found that access to computers was a major problem. Only one school reported a functioning server. This supported the assertion made elsewhere in this paper about connectivity problems. There was a need for the improvement of the computer laboratories. More than 86% of the respondents suggested that the provision of better ICTs and improved technical support would help in improving the use of GOL. This reinforces the assertion made earlier concerning the refurbishment of GOL.

Scrimshaw predicted, among other factors, that perceptions and attitudes impacted on the use of ICTs in education (2004: 5). This emerged as relevant to some schools. More than 71% of the respondents highlighted the negative attitude of some principals and educators as affecting the implementation of GOL. Such attitudes and perceptions of principals resulted in the negative uptake of GOL. Two of the principals saw GOL as destructive and not productive because educators and learners spent valuable time working with computers rather than reading a book or writing and/or teaching. Some teachers manipulated and abused GOL by doing their private or personal things in the computer laboratories. The Zakfiri principal commented that:

> *In 2006 our contracted technician once revealed that one of my educators was running a private business using school resources [time, computers and Internet].*

The biggest GOL limitation was time, since classes had to follow a timetable and use GOL during school time (between 08:00 and 14:00). Lastly, school-based respondents, particularly educators, were also concerned about the lack of leadership, lack of effective policies, and poor planning. This emanated from the fact that, in D11, only two officials were responsible for GOL in terms of monitoring and evaluating the functionality of the project. This suggested lack of

capacity as another barrier. This resulted in GDE officials neglecting some schools, while working closely with certain schools that showed interest in the project. It emerged that D11 GDE officials had a close relationship with Zamani and Zakfiri schools.

5.3.2.2 External barriers

An analysis of the literature suggested the following external barriers: multiculturalism, lack of access, lack of effective ICT training, lack of technical support, weak regulatory capacity, and weak curriculum integration. It is worth mentioning that these barriers were also mentioned by more than 86% of the respondents. In addition, there were other factors that appeared to be unique to the surveyed schools (Table 4.6). These were theft and vandalism, learners' background, and inadequate infrastructure.

It was noted that the number of schools reporting theft and vandalism had increased by 10% compared to the 2004/2005 financial year. More than 58 schools were broken into in the 2005/2006 financial year. More than 86% of the respondents attributed theft and vandalism to the ineffective security company that was contracted to the GDE. The security was a reaction unit; therefore, there were no physical security guards in place to secure the project. It was highlighted by the respondents that the response rate was generally low. It would take a day or two to respond. It is worth mentioning that out of the four surveyed schools, two schools were broken into in 2005.

In relation to the inadequate infrastructure, it was found that GOL planning was poor from the outset; hence some schools reported unreliable electricity supply. This assertion was supported by one GDE official who said that the main problem was the lack of electricity standards. Further, he commented that:

> *This [electricity] factor makes it difficult for GOL to function as expected, thus leading to schools*

neglecting computer laboratories which result into break-ins.

It emerged that some schools used more power than others. In some communities, there were community development programmes taking place, which also affected the school power supply, such as upgrading of roads, building of community parks, and building of shopping malls.

Lastly, more than 50% of the respondents highlighted the need for advanced ICT training. They believed that this would help teachers to learn technical skills in order to provide reliable technical support in their schools.

5.4 Conclusion

Chapter 5 provided a detailed analysis of the research data and literature available to determine the findings of the study. The study established that, even though respondents seem to be well aware of the benefits of using GOL in teaching and learning, they were faced with challenges. The main challenges faced by GOL were costs, theft and vandalism, access, inadequate infrastructure, and lack of formal ICT training. These challenges emphasised the need for effective leadership and policies.

The study also established that the GOL project was not integrated with the current curriculum. Principals and educators appeared to be confused about the objectives of the project. This calls for the GDE to continuously engage and communicate with the schools.

Finally, the negative attitude and perception of some principals and educators and age were observed as other major factors that affected the implementation of GOL.

6 Conclusion and recommendations

6.1 Overview of the study and recommendations

This section is aimed at presenting the conclusions and recommendations of the study. Conclusions are based on the findings of the study and GOL objectives. The overall objective of the research was to identify and investigate factors that impact on the implementation of GOL in D11 primary schools. To accomplish this objective, an assessment of enablers and barriers was established through semi-structured interviews.

Chapter 1 established the need for this study, the relevance of ICTs in education, and GOL objectives. Chapter 2 presented an overview of the literature on ICTs in education that provided insight into enablers and barriers that impact on the use of ICT in education.

Chapter 3 provided an overview of the research questions and research methodology. In Chapter 4, the research questions were answered based on the semi-structured interviews that had been conducted, and the findings were compared to the literature review section. The main research questions answered in this section were as follows:

- Which factors contribute to the successful implementation of the GOL project?
- Which factors hinder successful implementation of the GOL project?

In Chapter 5, the findings were discussed. It is obvious from the study that GOL is a complex programme to achieve and sustain. This study collected data from four schools (three respondents from each school), one district official, and one provincial official.

Although, on the whole, schools are using GOL, the study demonstrated that the project was faced with numerous factors, mainly challenges or barriers. The respondents highlighted various challenges. The impact of these challenges is that they lead to GOL failure. These challenges are imposed by both the internal and external school environment. In general, respondents highlighted similar factors as predicted by the literature. The common factors that were constantly raised by both the literature and respondents were access (dysfunctional servers), adequate financial resources (costs), training, technical support, poor integration of GOL with the curriculum, and infrastructure. It is worth noting that if these factors are adequate and available, it is possible that schools will succeed in implementing GOL. However, if these factors are inadequate, as was the case in most schools, GOL will not be implemented.

There were also some unique factors that this study observed from the surveyed schools, factors such as theft and vandalism, the negative attitude of some school principals and teachers, size and space of the computer laboratories, lack of leadership, and socio-economic factors of GOL users. Such findings demonstrate a need for close monitoring of the project in order to ensure effective and sufficient use and to achieve its set objectives. In general, only two schools seemed to be succeeding in implementing GOL; these were the schools with more enabling factors than barriers. These were suburb schools, compared to the two other township schools. This implies that, in township schools, GOL is not sufficiently implemented.

Also, it is demonstrated in this study that some schools are monopolising the project, and in most schools, community involvement is limited. This is against GOL objectives as discussed in Chapter 1 of this study. Lastly, both the literature and respondents agreed on the benefits of using ICTs in education, depending on the user's level of competence (Table 4.5).

6.2 Recommendations

This section documents the suggested recommendations for GOL implementation, and these recommendations are related to the factors highlighted by the respondents and the reviewed literature. It has been established in this study that the GOL project is one of the transformation projects aimed at addressing the skills shortage and the digital divide. However, it has emerged that the project is failing in achieving its set objectives. Therefore, remedial or corrective measures must be taken to eliminate risks and challenges. Also, in order to achieve and maintain the success of GOL, the other suggestion might be the promotion and encouragement of community ownership and involvement. This will have a twofold benefit, as the number of break-ins will be reduced and communities will acquire ICT skills.

Further, this study suggests the need for the careful assessment of school needs and the relevance of ICT in education through various data collection methods as applied in this study in order to promote the uptake and use of ICT projects such as GOL for teaching and learning. Advanced ICT training programmes should be developed for teachers. Success stories should be demonstrated to schools to show good practices and to help illustrate the benefits of ICTs in education. Lastly, a teaching community should be established and maintained.

One of the purposes of this study was to provide a model that could be useful in ensuring the successful implementation of GOL. Therefore, the following section presents a suggested checklist for effective implementation of GOL.

6.2.1 Checklist for successful GOL implementation

It is believed that this checklist will help to eliminate and reduce the barriers faced by schools in their quest to implement GOL. It is worth noting that this checklist provides a list of the key aspects that are crucial for the implementation of GOL. However, it does not suggest that these are the universal elements that

might lead to the sufficient use of GOL. The checklist emerged from the common themes highlighted by the respondents and the literature. It is vital to ensure the following:

- Adequate financial resources to cater for ICT costs.
- Conduct school(s) need analysis in order to understand the various school contexts.
- Computer software is consistently maintained and upgraded.
- Encourage community involvement in order to promote community ownership and stimulate the ICT industry.
- Provide 24-hour security in schools to ensure the safety of the project.
- Encourage teachers to become change agents in order to change their perceptions and attitude.
- Establish and maintain schools cluster networks in order to encourage peer learning.
- Provide advanced ICT training to the educators in order to improve their skills.
- Provide and put adequate technical support in place in order to ensure functioning servers.
- Develop and use educational software programs in order to integrate GOL/ICT with the curriculum.
- Develop and implement effective GOL policies that are aimed at providing direction and leadership.

6.3 Limitations of the study

It is worth noting that this was a small-scale exploratory study; therefore, the findings cannot be generalised to all Gauteng schools. Yet it would be worthwhile to further refine the factors suggested above and to develop them into more substantive statistical questions that can be used for ICT implementation in South African schools.

6.4 Suggestions for further research

The suggestions and recommendations that follow are made for those wishing to conduct research in a similar study. It emerged from the findings that even though the factors discussed above impacted on the implementation of GOL in the surveyed schools, there were other elements that were constantly raised by the respondents. Therefore, this study would like to suggest these for further research.

Among the factors highlighted in this study, respondents highlighted the impact of the background or socio-economic factors of GOL users. Therefore, it would be worthwhile for prospective researchers to evaluate the role of parents, the SGB, learners, educators, and the community in the use of ICTs in education.

Further, the study established the lack of GOL integration with the curriculum and that there were limited education software programs linked to the subjects. This impacted on the ability of the schools to use GOL for teaching and learning. In most schools, users used GOL to improve their computer skills and play games. Therefore, future research might also look at the integration of ICTs with the curriculum.

It was also established that the negative attitude of some school principals and educators impacted on the positive uptake and use of the GOL project. Therefore, prospective researchers might conduct research about the readiness of the school community in the uptake of ICT projects such as GOL.

Lastly, this study also demonstrated the impact of theft and vandalism, especially in the township schools. Some schools have been broken into more than once; this entails financial implications, as stolen computers must be replaced. Therefore, further research is recommended to assess security in schools.

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Appendix A

Comparison between enablers and barriers

Table 5.2: Enablers

Factors	Chillis	Ulwazi	Zamani	Zakfiri
Learning opportunity	✓	✓	✓	✓
Internet access	×	×	×	✓
Teacher and learner confidence	✓	✓	✓	✓
Training and development	✓	×	×	✓
Adequate technical support	×	×	×	✓
Financial resources	×	×	×	×
School safety	✓	×	×	×
GOL timetable	✓	✓	✓	✓
Information access	×	×	×	✓
Teacher readiness	×	×	×	✓
School IT champions	×	×	×	×
Reliable infrastructure	✓	×	×	✓
Cluster networks	×	×	×	×
Total number of factors	**6=✓** **7=×**	**3=✓** **10=×**	**3=✓** **10=×**	**9=✓** **4=×**

Table 5.3: Barriers

Factors	Chillis	Ulwazi	Zamani	Zakfiri
Theft and vandalism	×	✓	✓	×
Unreliable servers	✓	✓	✓	✓
Financial constraints	×	✓	✓	×
Time constraints	✓	✓	✓	✓
Technical problems	✓	✓	✓	×
Technophobia	×	✓	✓	×
Limited number of computers	✓	✓	✓	✓
Space	✓	✓	✓	✓
Lack of ICT formal training	✓	✓	✓	✓
Negative attitude of principals	×	✓	×	×
Inadequate infrastructure	✓	✓	✓	✓
Total number of factors	**7=✓ 4=×**	**11=✓ 0=×**	**10=✓ 1=×**	**6=✓ 5=×**

Appendix B

The request letter

Unit 48, No. 7 Lark Street
Meredale
2091
30 July 2007

Enquiries: 0836786574 (Mobile) or 011 435 3785 (Work)
Email: fezilenondonga@yahoo.co.uk

Dear Potential Interviewee

My name is Fezile Wycliff Nondonga, a Master's of Management student in the field of Public and Development Management at Wits University (Student No.: 0214426G). I am currently employed by the Department of Education as an Education Specialist: School Based at Regents Park Primary School (Persal No.: 18992188).

The main purpose of this study is to explore and identify "factors affecting the implementation of the Gauteng Online (GOL) project in D11 primary schools". This research is intended to contribute to our understanding of factors that contribute to the successful implementation of GOL and factors that inhibit the implementation of GOL.

The interview session contains 37 questions and will take 45-60 minutes. The interview will grant you an opportunity to contribute to the establishment of the best practice models on implementing ICTs in education and to voice your opinions about the project in general. Attached to this letter is a set of questions that I believe will help to identify both negative and positive factors in implementing GOL.

Thanking you in advance, and I am looking forward to your valuable input.

Yours truly
F.W. Nondonga (Mr)

Appendix C

Interview protocol

Confidentiality:

The views and opinions expressed during the interview sessions will be those of the respondent, and the highest confidentiality is guaranteed unless the respondent feels otherwise. Copies of the final document will be made available to the respondents. The data collected will only be used for the purpose of this study and the study programme.

Purpose statement:

This study seeks to identify factors that are most effective in enabling and encouraging the implementation and uptake of the GOL project in primary schools and also to identify the barriers that exist within schools that prevent the full implementation of GOL. This study will also address a research need, as there is minimal research available on ICTs in primary schools.

Instructions:

Please read the following questions carefully, and take your time to think about your answers/responses:

General questions:

- How long have you been working for the GDE?
- What is your position?
- What is your background?
- What qualifications do you have?
- Do you have any qualifications in ICTs?
- What level of qualifications do you have?
- Are those qualifications assisting you in the implementation of ICTs?

About GOL/computer use and access:

- For how long has your school been connected to GOL?
- Were you informed about the objectives of connecting GOL in your school?
- What are the main objectives of the GOL project?
- Are all computers working in your school?
- Why, or why not?
- Who uses them?
- What do you use these computers for?
- How often are these computers used?
- Are all educators using GOL?
- Do they have skills and knowledge of using ICTs?
- Who looks after the computer laboratories in your school?
- What is he/she responsible for?
- Does he/she allow everyone to have access to use the laboratory/ICTs?
- For how many hours a day is the laboratory accessibly to all the members of the school community?

About enabling factors:

- What contributes to the effective and efficient use of GOL in your school?
- Which element contributes the most?
- What are the benefits of using computers in education?

About the hindering factors:

- What hinders the use of GOL/computers in your school?
- Are there any other challenges or barriers that inhibit the use of the computers? What are those challenges/barriers?
- How do you deal with these challenges?
- What are the limitations of using computers?

About planning, support, and leadership:

- How does the school plan for the implementation of GOL?
- What is the role of:

    - departmental officials;
    - SGB;
    - school principal;
    - educators; and
    - learners and parents?
- Do any of these groups, in particular, influence how the project works?
- Is there adequate technical support provided? Who provides the support?
- Does this impact on your ability to work in the project? Is it good or bad?
- Do GOL-connected schools get other support from senior management?
- Is the support assisting in integrating GOL with learning and teaching? Why, or why not?
- Is the support assisting in training and developing educators and learners in GOL-connected primary schools? Why, or why not?

About the experience of implementing GOL:

- How would you describe the experience of using GOL since its connection?
- What would you say is the most important factor in your view that helps the project to work or that negatively affects the project?
- Are there any other factors that we have not talked about that you think affect the implementation of GOL?