Bridging the digital divide: A South African perspective on minimally invasive education

by

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Submitted in partial fulfilment of the requirements for the degree

Magister Educationis

in

Computer-Integrated Education

in the

Department of Curriculum Studies

Faculty of Education

University of Pretoria

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2005

I dedicate this dissertation to my husband, Don and my children, Dietrich and Igna.

Thank you for always being there…

Acknowledgements

I would like to take the opportunity to express my appreciation to the following people who contributed to the success of this study:

- My supervisor, Prof Cronjé, for his guidance and support;
- My principal and colleagues at school for their moral support;
- My mother, my family and my friends whom I unfortunately, in the process of meeting the deadlines I set for myself, often had to neglect;
- My sister, Brenda, for her moral support and Arlene for her financial support to make this dissertation possible;
- My friend, Linda, who was a good sound board and literally walked with me through the course;
- My housekeeper, Elizabeth Sono, for her assistance and for running the family home during my absence;
- The CSIR, especially Ronel, Kim and Grant from the Department of Information Society Technologies, for their support, help and assistance;
- The target population, who became my friends during this whole research project;
- The principal of Bud Mbelle Lower Primary School for her co-operation and helpfulness;
- The librarians of Saulsville Community Library, especially Ruth-Anne and Tshidi for their co-operation throughout the project;

Above all, to God be the honour and glory.

Table of Contents

List of Tables

List of Figures

List of Abbreviations and Acronyms

Abbreviations and Acronyms	Description
CSIR	Council for Scientific and Industrial Research
DST	Department of Science and Technology
ICT	Information and Communication Technology
IST	Information Society Technologies
MIE	Minimally Invasive Education
NEPAD	New Partnership for Africa's Development
OBE	Outcomes Based Education

Summary

Advances in Information and Communication Technologies (ICTs) have brought many opportunities to South Africa and also challenges, such as narrowing the gap, known as the digital divide, between those who have (the “haves”) and those who do not have (the “have-nots”) access to ICTs. The majority of South Africans living in developing areas throughout South Africa do not have access to computers and are mostly computer illiterate.

The Council for Scientific and Industrial Research (CSIR) launched their Digital Doorway project across South Africa to evaluate the feasibility of an alternative computer training method following a minimally invasive educational approach. Within the scope of the CSIR’s project, this research study endeavoured to explore to what extent and how the children had obtained computer skills, without the guidance of a facilitator, during the Digital Doorway project launched in Atteridgeville, Pretoria.

A qualitative research methodology was adopted for the study.

During the course of this research project, it was not possible to determine whether the children obtained any initial or additional computer skills, since the children were mostly unable to use the computers due to the malfunctioning thereof.

The findings of this study coincide with authoritative literature on the topic which points out that real ICT access entails more than merely installing hardware and software.

Keywords

Computer literacy
Computer skills
Computer training
Digital divide
Digital doorway
“Hole-in-the-Wall” experiment
Information and Communication Technologies
Minimally Invasive Education

Chapter 1: Introduction

1. Introduction

The impact of computer technology on our society as a whole has been tremendous and described as being as revolutionary as that of the Renaissance and of the Industrial Age (eNotes, n.d.).

Today, most people are realising that knowing how to use a computer, especially a personal computer, is a basic skill required to function effectively in society. Given the increasing use and availability of computer systems, computer proficiency will continue to be an essential required skill in future (Shelly, Cashman, Waggoner, & Waggoner, 2000, p. 1.2).

In a developing country like South Africa, advances in Information and Communication Technologies (ICTs) have not only brought about many opportunities, but have also created challenges.

The vast majority of South Africans living in the developing areas of South Africa do not have access to computers and are therefore mostly computer illiterate. New and alternative strategies therefore have to be devised to overcome this problem.

The Council for Scientific and Industrial Research (CSIR), in collaboration with the Department of Science and Technology (DST), has launched a project to evaluate the feasibility of alternative computer training methods. Their project is known as the Digital Doorway. Within the broader scope of the CSIR's project, this research study endeavours to explore whether children from the Atteridgeville developing area are capable of obtaining basic computer skills without the guidance of facilitators.

2. Background

A Green paper published by the Minister of Welfare and Population Development in 1995 (Polity, 1995) indicates that the vast majority of South Africans (51,7%) live in developing areas and that only half of the rural population are literate. Most South African households are poor and the distribution of wealth and income is reckoned as of the most unequal in the world. Most people still do not have sufficient access to education, electricity, water and health care (May, 1998).

According to the Deputy Minister of Education, Mr Enver Surty, the majority of children were deprived of education in the past, which had a negative effect on their development. The Government has since adopted the Expanded Public Works Programme, which utilises money received from the private sector to create work opportunities by developing skills, thereby reducing poverty and unemployment (South African Department of Education, 2004).

The Department of Education (2003, p. 1) asserts that in South Africa there is still a huge digital divide (the gap that exists between those who have access to and use technology and those who do not have access to or use technology) although the use of ICTs increased by

20% in 2002. At this stage only 6.4% of South Africans use and have access to the Internet, compared to 72.7% Americans.

Africa is regarded as a developing continent and according to the Department of Education (2003, p. 2) "a lack of infrastructure for Information and Communication Technologies is widening the gap between Africa and the developed world."

The New Partnership for Africa's Development (NEPAD) identified Information and Communication Technology (ICT) as an effective tool to reduce poverty in Africa. South Africa's president, Mr Thabo Mbeki, also stressed the importance of ICT as critical in the fight against poverty in the following way:

> *We must continue the fight for liberation against poverty, against under-development, against marginalisation and …information and communication technology…is a critically important tool in that struggle (Department of Education, 2003, p. 3).*

The Department of Education (2003, p. 3) identified the following three critical elements that will determine or even hamper ICT's future as an effective tool for economic as well as social development:

- Cost – solutions have to be cost-effective to be able to reach the most remote parts of South Africa;
- Sustainability – technology has to be sustained to be effective and;
- Utilisation – ICTs have to be utilised efficiently to be effective.

Finding alternative cost-effective training solutions for South Africa forms the premise of this study. The Digital Doorway projects launched by the CSIR might prove a cost-effective computer training solution for the majority of people living in developing areas of South Africa.

3. Terminology

For the purposes of an introduction to the study, the following concepts are described:

- Digital Divide

The digital divide can be described as the gap that exists between those who have access (the "haves") and those who do not have access (the "have-nots") to Information and Communication Technologies.

- Digital Doorway project

The Digital Doorway refers to projects that were launched by the CSIR in collaboration with the DST by installing computer equipment in developing areas throughout South Africa. The

objective is to allow communities to learn how to use computer equipment by themselves, which is commonly referred to as Minimally Invasive Education.

- "Hole-in-the-Wall" experiment

The "Hole-in-the-Wall" experiment refers to an experiment conducted by Dr Mitra in India. A computer was placed in a hole in a slum area of India. The community were given free access to the computer to teach themselves computer skills.

- Information and Communication Technologies

A combination of hardware, software and networks as well as a method of communication, engagement and collaboration which enable the management, processing and exchange of data, information and knowledge.

- Minimally Invasive Education

Minimally Invasive Education is the term used by Dr Mitra to describe the teaching method used in his "Hole-in-the-Wall" experiment. It refers to an educational method where people teach themselves with minimal or no guidance.

4. Digital Doorway

The CSIR's Centre for Information Society Technologies (IST), in collaboration with the DST has realised the importance of computer literacy as of paramount importance to development in today's world. Computer literacy is, however, only available to the few that can afford training as it is:

- Expensive;
- Requires a costly infrastructure and;
- Computer equipment is expensive.

The CSIR and the DST, aware of society's demands for computer literacy, launched the Digital Doorway in certain developing areas throughout South Africa. The Digital Doorway follows an extreme constructivist approach called Minimally Invasive Education (MIE). Several communities living in different developing areas throughout South Africa each received a computer from the CSIR which they then had to explore, examine and learn to use by themselves without the guidance of a facilitator.

The idea for the project originally came from an experiment conducted by Dr Sugata Mitra of India, known as the "Hole-in-the-Wall" experiment. The purpose of his experiment was to determine whether children, given free, unlimited access to computers and the Internet, would be capable of teaching themselves how to use the computer with little or no assistance from a teacher (O'Connor, 2002). Dr Mitra referred to this teaching method as Minimally Invasive Education (MIE), which is defined as:

> *A pedagogic method that uses the learning environment to generate an adequate level of motivation to induce learning in groups of children, with minimal, or no, intervention by a teacher (Mitra, 2003).*

Dr Mitra's concept of Minimally Invasive Education (MIE) was embraced by the CSIR and the DST to provide an opportunity for the vast majority of people from disadvantaged backgrounds and developing areas in South Africa to become computer literate (CSIR, 2004). The aim of the Digital Doorway is to:

> *…ascertain whether people possess the cognitive ability to obtain computer skills without being formally trained (Smith, Cambridge, & Gush, n.d.).*

The Digital Doorway can be seen as a paradigm shift in education. The Gauteng Department of Education (2003) refers to a paradigm shift as:

- A complete new approach on matters that you believe in;
- A new game with new rules;
- A change in your beliefs about teaching practices, learning, learners and school management (Gauteng Department of Education, 2003).

This research was conducted within the context of Mitra's conceptual framework known as Minimally Invasive Education.

4.1 Rationale behind the Digital Doorway projects

A summary of the CSIR's and DST's rationale behind the Digital Doorway projects, is depicted in Table 1 (Smith et al., n.d.)

Table 1: Rationale behind the Digital Doorway projects (Smith et al., n.d.)

Rationale behind the Digital Doorway projects	
CSIR's view of Digital Doorway projects:	The CSIR regards the Digital Doorway as: "…one of the best, cheapest and most innovative methods of meeting the technological needs of developing countries and providing people with access to information in order to bridge the digital divide" (Smith et al., n.d.).
Aim:	The aim of the Digital Doorway is to: "provide people in rural and disadvantaged areas with computer equipment, and allow them to experiment and learn without formal training and with minimal external input" (Smith et al., n.d.).
Hypothesis:	The CSIR are of the opinion that: "children possess the cognitive ability to acquire functional computer skills without formal training" (Smith et al., n.d.).

Rationale behind the Digital Doorway projects	
Computer equipment provided:	The people are capable of seeing and using the following equipment: – Terminal; – Keyboard; – Touch mouse.
Objectives:	The objectives of the Digital Doorway are to: – "Test the feasibility of minimally invasive education as an alternative mechanism for large-scale computer literacy in South Africa; – Determine the efficiency of the Digital Doorway concept as a delivery mechanism for PC literacy as well as information and service delivery in South Africa; – Determine whether potential users in a rural community in South Africa will use a PC based outdoor kiosk without any instruction; – Determine whether a PC based kiosk can operate without supervision in an outdoor location in South Africa; – Provide a platform for the evaluation of appropriate technology solutions, open source, applications and human language technology; – Determine salient issues such as: – Effectiveness of applications installed on kiosk; – Effectiveness of logging and observation mechanisms; – Benefits of technology as deployed; – Sustainability; – Effectiveness in attracting women. – Use the infrastructure established as a test bed for culturally sensitive computing, human computer interface and the role of human language in computer interaction" (Smith et al., n.d.).

4.2 First Digital Doorway Installation

The first Digital Doorway was launched in Cwili, in the Eastern Cape. Figure 1 portrays the exact location of Cwili (Smith et al., n.d.):

Figure 1: Location of Cwili in the Eastern Cape (Smith et al., n.d.)

4.3 Results of First Digital Doorway Installation

Smith et al. (n.d.) reported that the children were mastering basic computer skills at a tremendous speed and that they were capable of using the computer with confidence within days after the initial installation.

Observations and interviews conducted with the villagers of Cwili, indicated that:

> *…both children and young adults, have moved from an initial state of computer illiteracy to a state where the computer is approached with great confidence and an awareness of some of its exciting multiple uses (Smith et al., n.d.).*

The results obtained from the Digital Doorway in Cwili, could therefore compare well with the observations made by Dr Mitra during his “Hole-in-the-Wall” experiment.

4.4 Proposed Further Digital Doorway Sites

After the successful implementation of the Digital Doorway in Cwili, the CSIR identified the following developing areas where Digital Doorways will be installed in future as depicted in Figure 2.

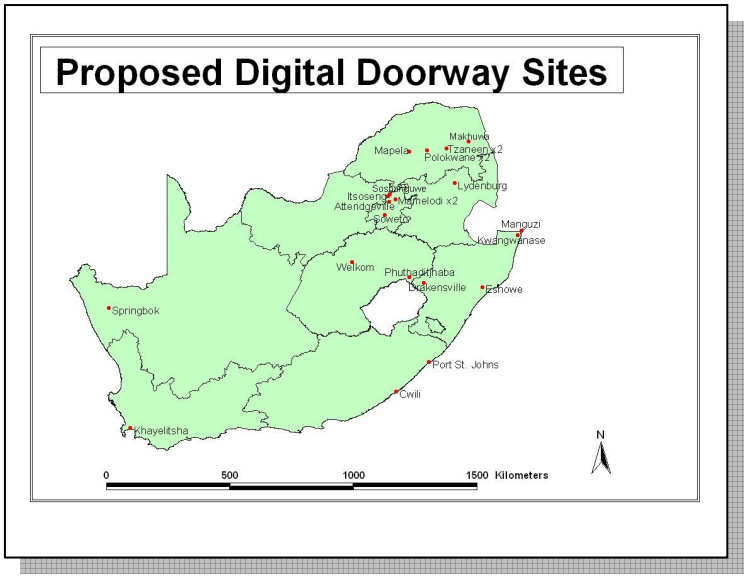

Figure 2: Proposed Digital Doorway Sites (Smith, Ronel "personal communication," February 1, 2005)

5. Digital Doorway in Atteridgeville

As indicated on the map in Figure 3, Atteridgeville, a township adjacent to Pretoria, was designated by the CSIR for the implementation of a Digital Doorway. As a resident of Pretoria, I decided in collaboration with the CSIR, that Atteridgeville, mainly due to the convenience thereof, would be used for the research project.

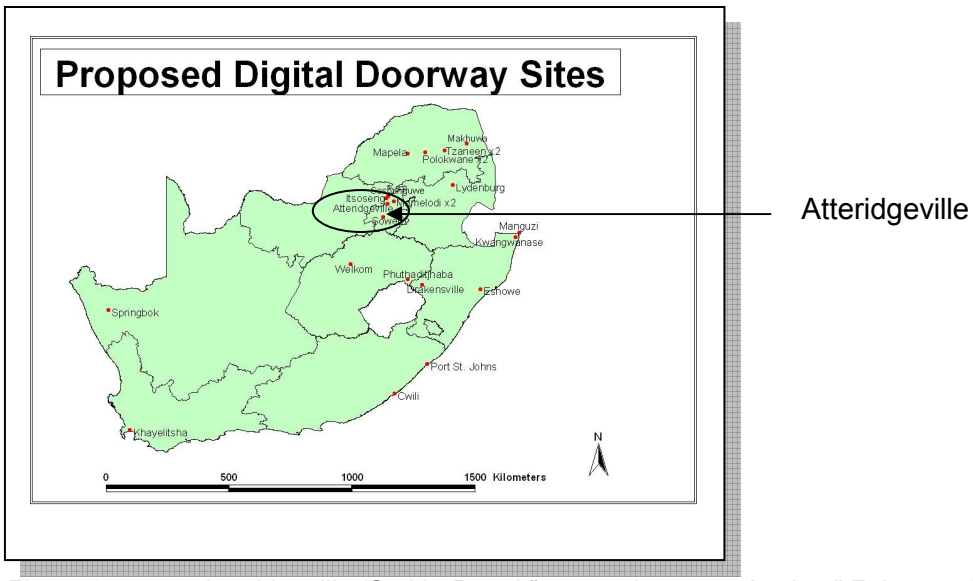

Figure 3: Atteridgeville (Smith, Ronel "personal communication," February 1, 2005)

5.1 Installation of Digital Doorway Equipment

The CSIR installed the Digital Doorway in Atteridgeville on 5 April 2005. I entered the field with some staff members of the CSIR mainly for the residents and children to become familiarised with me as being part of the installation team of the CSIR. Figure 4 was taken during the installation at Atteridgeville.

Figure 4: Installation at Atteridgeville

Atteridgeville is divided into nine different wards. The Digital Doorway was installed in the Saulsville Arena (Ward 68), next to the community library. Saulsville has a population of 21 277 comprising 4 779 households (Simelane, Reuben "personal communication," April 21, 2005). Figure 5 depicts the physical location of the Digital Doorway in Atteridgeville (MapStudio, 1997/1998, p. 34).

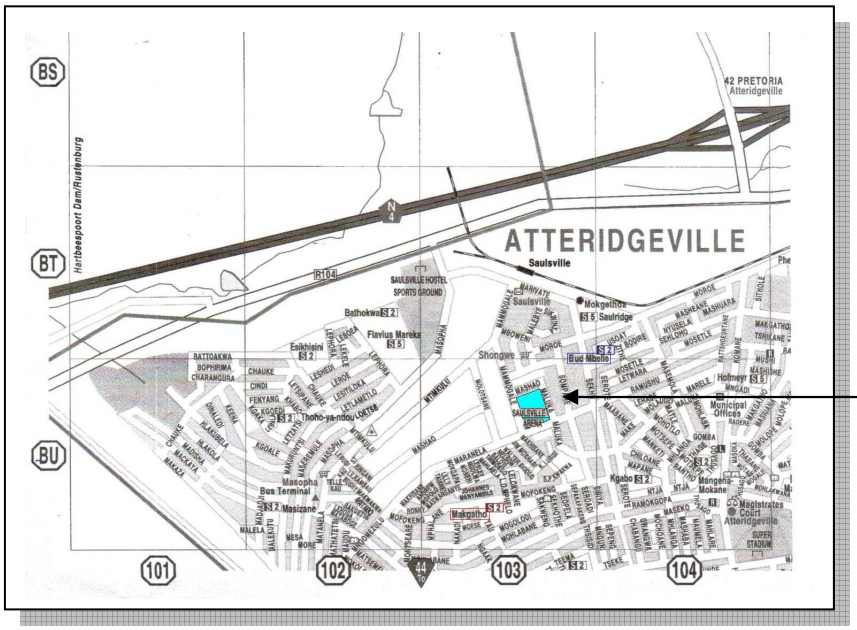

Figure 5: Physical location of the Digital Doorway in Atteridgeville (MapStudio, 1997/1998)

The CSIR requires of every community identified for receiving a computer, to lay a concrete slab and to build a shelter where the Digital Doorway can be housed. A shelter was built by the leaders of the Atteridgeville community for the Digital Doorway. Figure 6 depicts the shelter.

Figure 6: Shelter built by leaders of the Atteridgeville community for the Digital Doorway

The shelter was well situated as it was next to the Saulsville Arena, community library and the Post Office. The librarians confirmed that the library was well visited by the children, especially after school and that the Digital Doorway should therefore receive quite a lot of attention. Figures 7 and 8 depict the location of the Digital Doorway in respect to the Saulsville Arena and community library.

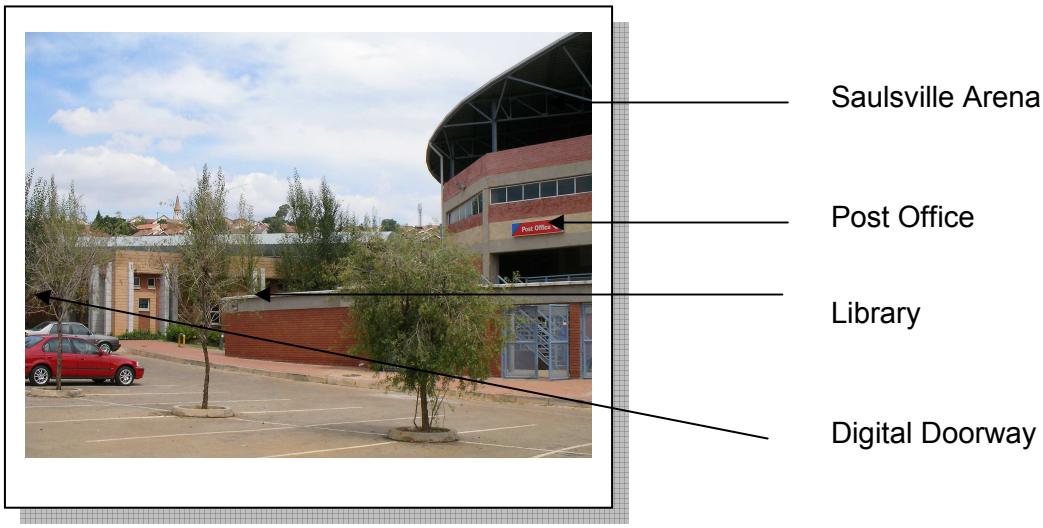

Figure 7: Location of the Digital Doorway in respect to Saulsville arena and community library

Figure 8: Community library adjacent to Digital Doorway

During installation, the staff of the CSIR and I were questioned by different members of the community about the installation. The community raised some concerns at this point which were mainly:

- Who is responsible for cleaning the computer and the computer kiosk?
- Are there going to be gates placed in front of the computer kiosk to detain unwanted elements? If the computer kiosk were not secured properly, the residents felt it might be used by some people as a shelter and as a public toilet.
- How much does it cost to work on the computer?
- Who are allowed to work on the computer?
- During which times will the Digital Doorway be in operation?

Figure 9 depicts a concerned resident of Atteridgeville in conversation with Kim Gush from the CSIR.

Figure 9: Kim Gush (CSIR) in conversation with a concerned resident

During a conversation with the librarians at the Saulsville library, they deemed it necessary for the community to be informed about the Digital Doorway especially the fact that it was free of charge for the community to use. At this stage I thought it might be a good idea to contact the primary schools closest to the Digital Doorway and to introduce the school leaders to the Digital Doorway. By introducing the Digital Doorway to these children, the news should spread further by word of mouth.

The research methodology used will be discussed in full in Chapter 3 of this mini-dissertation.

6. Rationale for research

During my early years of teaching I was behaviouristic in my approach and I believed that the most rewarding grade to teach was grade one learners. I was an advocate of Skinner's theory that a child was born with a "blank slate" (Mark, 2002). A grade one teacher was therefore very fortunate as she was able to imprint on the children's blank slates. She was capable of teaching these children how to read, write and spell, which I regarded as an opportunity and very rewarding. The observable changes in the behaviour of the children were then measured by the teacher. If a child reacted positively to the teaching, he was rewarded and positive behaviour was then reinforced (Open Learning Technology Corporation, 1996).

After becoming actively involved in computer training during 2000, I realised that children were also capable of learning differently and I no longer regarded them as merely coming to school with a blank slate. I noticed that some learners were generally capable of exploring the computer by themselves after initially being introduced to it by a facilitator, family or peers. I, however, found that although some children obtained basic computer skills by themselves, they were rarely capable of doing much more than playing games. I found that children were generally capable of using the computer mouse and some keys on the keyboard, especially the arrows, spacebar and enter keys which were mainly used for games. I also found that the hand-eye coordination of the children, who played a lot of computer games, was excellent.

Parents would quite often try to convince me that their children spent hours in front of the computer and were according to them extremely competent and capable of using the computer optimally. I somehow had my doubts as to how much they were really capable of. As a behaviourist, I still believed that children should be taught basic computer skills and how to use different software programs and that "practice makes perfect".

Some time ago I watched a video clip on the National Geographic channel about the "Hole-in-the-Wall" experiment conducted by Dr Mitra in India and I immediately thought it would be fantastic if we could launch similar projects in South Africa. I was therefore amazed when I heard about the CSIR's Digital Doorway. What fascinated me mostly about the project was that learning occurred without the guidance of facilitators. I decided that I would like to do research to explore whether children were really capable of learning how to use the computer without the guidance of a facilitator and to what extent and in which way learning had taken place.

If this research indicates that children are capable of teaching themselves how to use the computer without the guidance of a facilitator, it could lead to the vast majority of people in South Africa, who are at this stage still computer illiterate, to become computer literate. This could lead to an enormous cost saving for the government of South Africa. In becoming computer literate people would lose their technophobia and in the process they would obtain enough confidence to utilise everyday computer applications such as ATM's, Internet banking, etcetera.

The findings of this research could be of paramount importance in how:

- The CSIR could improve or adjust the Digital Doorway project;
- The government of South Africa could roll out an ITC infrastructure that could meet the needs of the developing areas and the country as a whole in future;
- The Department of Education structures its teaching methods;
- ITC training in South Africa can be approached (or adopted) in future.

7. Purpose of research

The purpose of this research project was to explore whether children are capable of obtaining computer skills successfully without the guidance of a facilitator during the Digital Doorway project in Atteridgeville, a developing area in South Africa.

In determining whether children are capable of obtaining computer skills successfully it will be necessary to answer the following two critical questions that were identified:

- First critical question

To what extent had children obtained computer skills through the launching of the Digital Doorway project in Atteridgeville?

- Second critical question

How did these children obtain computer skills without the guidance of a facilitator during the course of the Digital Doorway project in Atteridgeville?

8. The research plan

The methodology adopted for this study was a qualitative research methodology. The research included a:

- Literature review which included the following:
  - a short overview of the developments in Information and Communication Technologies that gave rise to the information age;
  - discussion of the digital divide concept;
  - an explanation of the role education can play in bridging the digital divide.
- Qualitative research addressing the two critical questions to explore:
  - To what extent have children obtained computer skills? and
  - How did these children obtain computer skills without the guidance of facilitators?

Data was gathered by means of individual as well as focus group interviews. Data obtained during the individual and focus group interviews was video recorded, tape recorded, schedules were completed by the target population and field notes were made to determine:

- To what extent the children obtained computer skills; and
- How they obtained these skills without the guidance of a facilitator.

9. Limitations of the study

This research project only investigated the appropriateness of Minimally Invasive Education as a learning method within the scope of the overall Digital Doorway project.

The limitations of the study that were therefore identified at the onset of the research project were:

- Research conducted will be limited to a specific developing area in South Africa, in this case Atteridgeville and findings may therefore only be generalised after conducting similar research in different developing areas in South Africa;
- Research findings are limited to the South African context;
- a small sample group will be used;
- Research will only concentrate on the acquisition of computer skills (using a small sample group) without the guidance of a facilitator.

10. Significance of the study

The implications of the research could be far reaching for:

- The CSIR as they will obtain knowledge to what extent children have obtained computer skills through the Digital Doorway installed in Atteridgeville;
  - which methods the children used to obtain these computer skills;
  - what problems the target population experienced with regard to the Digital Doorway;
  - what improvements could be made with regard to the effective utilisation of a Digital Doorway;
  - what measures could be taken with regard to the sustainability of a Digital Doorway;
- The Government of South Africa, as they currently realise that:
  - all its people should master modern technologies (Department of Science and Technology, 2002);
  - computer training is costly and this study could portray a less costly method in providing computer training to the vast majority of South Africa's people living in the developing areas, who are still computer illiterate;
- The Department of Education in South Africa as well as educationalists worldwide as it could be:
  - a significant study to indicate how ICT could be deployed in schools.

11. Organisation of the mini-dissertation

Figure 10 provides a diagrammatic illustration of how the mini-dissertation is logically organised.

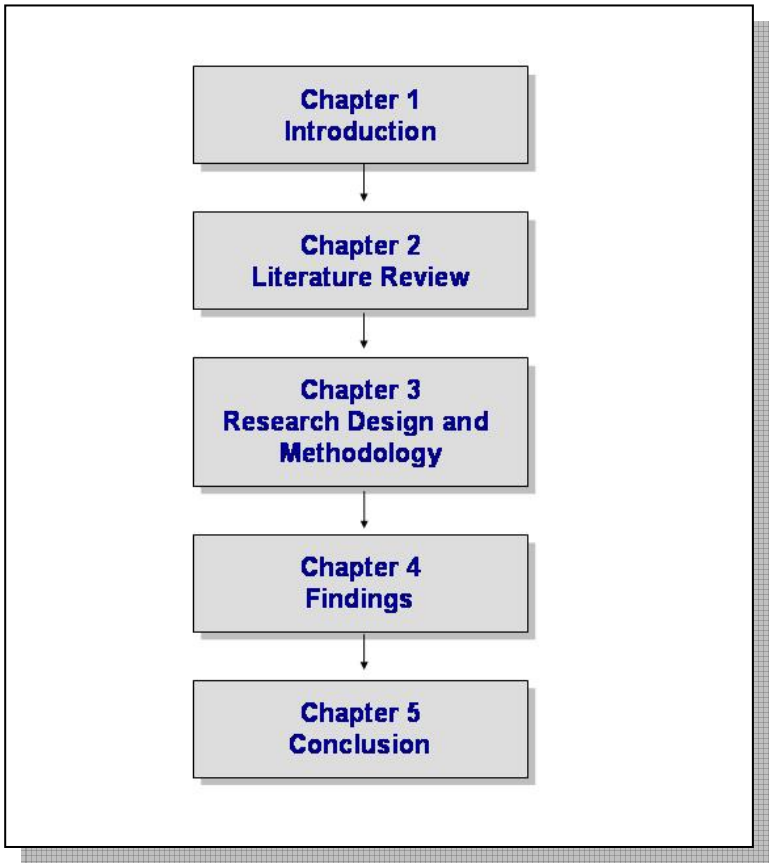

Figure 10: Diagrammatic illustration of structure of research study

Table 2 provides the reader with a more detailed description of how the mini-dissertation is organised.

Table 2: Organisation of mini-dissertation

Organisation of mini-dissertation	
Chapter 1: Introduction	– Introduction to the research; – Background to the research; – Terminology used in this mini-dissertation; – Introduction to the Digital Doorway project; – The Digital Doorway project in Atteridgeville; – Rationale for the research; – Purpose of the research; – The research plan; – Limitations of the research; – Significance of the study.

Organisation of mini-dissertation	
Chapter 2: Literature Review	– A short overview of the developments in Information and Communication Technologies that gave rise to the information age; – Discussion of the digital divide concept; – An explanation of the role education can play in bridging the digital divide; – A synopsis of Dr Mitra's concept of Minimally Invasive Education.
Chapter 3: Research Design and Methodology	Description of the: – Research instruments; – Data collection plan; and – Data analysis.
Chapter 4: Findings	– Description of the extent and appropriateness of the learning obtained by children without the guidance of facilitators at the Digital Doorway in Atteridgeville; – Description of the problems that deterred learning.
Chapter 5: Conclusion	– Summary of the research findings; – Conclusion; – Recommendations.

Chapter 2: Literature Review

1. Introduction

Over the last decade the world has witnessed the birth of a new period in its history, which most authors correctly call the Information Age. The forces that the developments in Information and Communication Technologies (ICTs) have released can be compared with a global tidal wave which is sweeping over the world (Ifinedo, 2005, p. 1).

Herselman and Britton (2002) assert that we are furthermore today experiencing a "world of greater interconnectivity and an accelerated flow of data". They furthermore state that:

> *The force driving this rapid revolution in communication transforming the world from isolated islands to interconnected super highways is ICT. (p. 270)*

ICT, in terms of the discussions of this research study, can be defined as the blending of information (computer) technologies and telecommunication technologies into a "union" now called Information and Communication Technologies (ICTs). It can be explained in the following way:

> *Computers enable people to work creatively. But they are limited by what they can access. Adding a communications channel, such as the Internet or other information services, significantly extends the capability of the computer. It allows it to be not only an inexpensive communication device. It can also become a means of obtaining education, information, and working creatively with others irrespective of geographical barriers (Mobbs, 2002).*

Economies able to take advantage of the opportunities brought about by the innovations in ICTs are in the position to "leapfrog" economies which are not seizing the opportunities being created (International Labour Organization). In a developing country like South Africa advances in ICTs have created a magnitude of opportunities for the country and poses a whole lot of challenges as well. One of the most important challenges is addressing the frightening gap between the information "haves" and the information "have-nots", which is commonly known as the digital divide.

Digital divide means different things to different people and will probably continue to do so for some time to come in spite of a considerable effort to establish a consensus definition. The digital divide is a complex issue, which has been hotly debated recently. Definitions range from being very rigid basically defining it as "the lack of access to computers between racial groups" to more comprehensive definitions that define the digital divide as "the lack of information and communication technology, equipment and knowledge" between regions, age and cultural groups or genders (Bridges.org, 2001).

The focus of this study will be on the "knowledge gap" or digital divide that exists at the learner level in South Africa and how it can be bridged. Herselman (1999, p. 197) describes this "knowledge gap" as the gap that exists between the resource-advantaged (RA) learners and the resource-deprived (RD) learners.

Costello (cited in Herselman and Britton, 2002) asserts that the current information age which he calls the current "Golden Age of Technology" is being constructed on a "foundation of knowledge". He further explains:

> *As such, the fuel for the engine of expansion will be an increasingly better-educated populous. And the fruits of this Golden Age will go to those who have the knowledge in our society, the haves and the have-nots, more than ever before will be the educated and the uneducated. (p. 270)*

By implication, Costello is saying to build capacity in the new knowledge economy in order to exploit the benefits of the information age, requires a better educated population. This will require an investment in schooling and a development of means to improve literacy levels and skills among that part of the population that are beyond the school age since this latter part of the population would be most immediately affected in the new economy.

A large percentage of South Africans who live in developing and rural areas throughout South Africa do not have access to or have very little access to ICTs. These people have basically no access to computers and as a result are computer illiterate.

In addressing this literacy problem in South Africa, the Council for Scientific and Industrial Research (CSIR) has launched a project in collaboration with the Department of Science and Technology (DST) to evaluate the feasibility of an alternative computer training method known as Minimally Invasive Education.

Dr Sugata Mitra, who coined the term, defines Minimally Invasive Education (MIE) as an educational method that utilises the environment in which learning occurs to:

> *…generate an adequate level of motivation to induce learning in groups of children, with minimal, or no, intervention by a teacher (Mitra, 2003).*

It is impossible to discuss the concepts of digital divide and education's role in bridging the digital divide and Minimally Invasive Education, without first giving a perspective on ICT and its rapid advancements which have given rise to the information age with its commensurate impact on society as a whole.

This chapter proposes to:

- Provide an overview of the developments in Information and Communication Technologies that gave rise to the information age;
- Discuss the concept of digital divide;

- Provide a perspective on education's role in bridging the digital divide;
- Give a brief synopsis of Dr Mitra's concept of Minimally Invasive Education and some background to the "Hole-in-the-Wall" experiment which he conducted in India.

Figure 11 depicts a diagrammatic presentation of how the various components or topics of the literature review fit together.

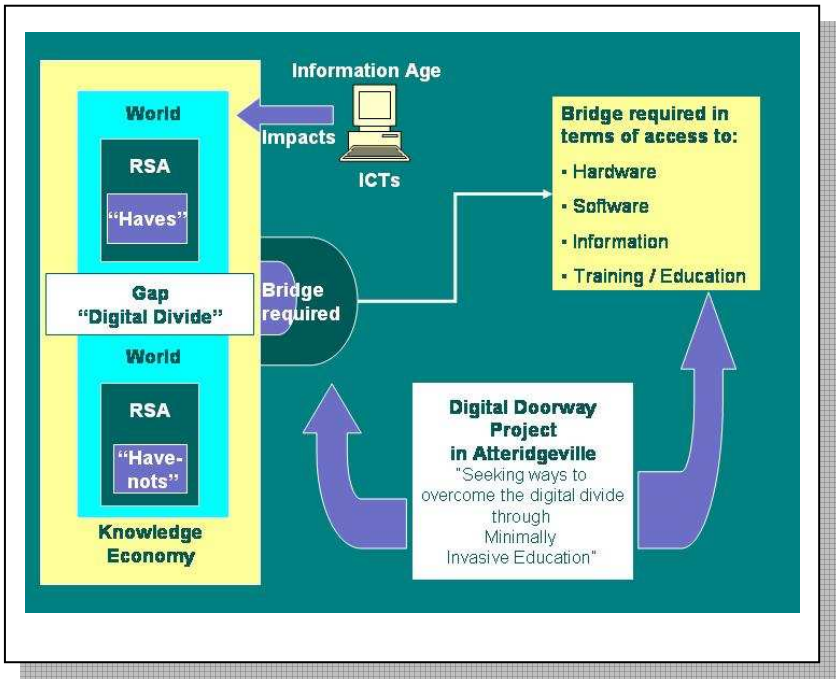

Figure 11: Diagrammatic presentation of literature review components

The big yellow rectangle on the left of the diagram illustrates the digital divide that exists in the information age in the world as a whole as well as in South Africa between the "haves" and the "have-nots".

The bridge (depicted to the right of the yellow rectangle) is required to alleviate this divide which consists of a combination of hardware, software, information, training and various other components.

The Digital Doorway project (illustrated at the bottom right) seeks out ways to overcome the digital divide through Minimally Invasive Education.

2. The Information Age

The world economy is in the centre of a profound transformation, spurred by globalisation and supported by the rapid development of ICT that accelerates the transmission and use of information and technology. This powerful combination of forces is changing the way we live, and redefining the way organisations conduct business.

Technology is a very powerful force for change that has been compared to the invention of the printing press, electric light and the telephone which have fundamentally altered the

world (Lewis, 1999, Oblinger and Verville, 1999, Williams et al, 2000 as cited in Letseka, 2001, p. 67).

The developments in Information and Communication Technologies over the last thirty years resulted in an information explosion which heralded an information age and a knowledge revolution (Chandrasekhar & Ghosh, 2001, p. 850).

The information age may not be a totally new concept, but it is one that is evolving daily. Information and communication technology, that have underpinned the birth of the information age, is changing every aspect of our lives. It impacts on the way in which people communicate and interact culturally with each other, obtain information, learn and conduct business. The Internet makes it possible for consumers to enquire about prices for products offered on the World Wide Web in almost a split second. Markets all over the world have become accessible through the Internet. It is now possible for businesses to deliver some of their products (for example software) down a phone line all over the globe with the mere pressing of a button, twenty four hours a day and 365 days a year (Ministry of Economic Development).

Letseka (2001) points out that the processing output dissemination and storage of data also look totally different in the information age. He explains it in the following way:

> *There has been a radical (paradigm) shift in the manner in which offices, companies, institutions of learning (especially tertiary institutions); families and individuals manage their data. It is a shift that is characterized by a move away from relying on paper, files and filing cabinets for storing and disseminating information to the use of electronic media – the Internet and electronic mail – e-mail, CD-Roms, computer hard-drives and diskettes. (p. 67)*

It is clear from the above discussion that Information and Communication Technologies (ICTs) add value to the global economy by allowing users to participate in the economy by utilising faster, interactive and cost efficient communication networks and information technology to generate, process, transmit and disseminate data.

At the very centre of the opportunities that have been created by ICTs, one finds the unparalleled development in ICTs and the commensurate drop in ICT costs over the last thirty years. Chandrasekhar and Ghosh (2001, p. 851) explain that these ICT developments include:

- The amazing increase in computing ability and commensurate, drastic decrease in cost offered by the emergence and evolution in microprocessor technology;
- The development of digital devices (for example devices that record, organise, retrieve, display and disseminate information) that are able to exploit the computing ability achieved at a fraction of its previous cost; and
- The growing capability of linking computing devices and in the process allowing communication between computing devices based on common protocols.

To fully understand the reduction in cost in ICT devices over the last thirty years, one only needs to look at some of the statistics provided by Chandrasekhar and Ghosh (2001):

> *In the three decades since 1971, the number of transistors on a chip has increased from 2300 on the 4004 to 42 million on the Pentium 4 processor and the cost per Mhz of computing power has fallen from US$760 in 1970 to 17 cents in 1999. (p. 851)*

Chandrasekhar and Ghosh (2001) also mention that:

> *…the improvements in communication technology have reduced the cost of transmitting a trillion bits of information from US$150 000 to 12 cents over the last three decades. (p. 851)*

It is increasingly becoming common today to see more and more countries across the world making a shift away from their former agricultural-based and industry-based economies to one that is knowledge-based in which the use of information in its widest sense, thrives. Hart (2003), cited in Ifinedo (2005, p. 1), refers to such a knowledge-based economy as a "network economy." Neff (1998), cited in Ifinedo (2005, p. 1), calls it a "knowledge economy" and Turner (2001), cited in Ifinedo (2005, p. 1), calls it an "E-economy". Castells (1999a), also cited in Ifinedo (2005, p. 1), calls it an "information economy".

What then is a knowledge economy? A knowledge economy can be described as an economy in which:

> *…the generation and exploitation of knowledge play the predominant part in the creation of wealth (United Kingdom Department of Trade and Industry, (1998) cited in Ministry of Economic Development).*

Intellect (2004) explains that a knowledge-driven economy is not merely an IT economy, but it is an economy which takes advantage of knowledge being applied to create wealth across all commercial activity in the particular economy. In a knowledge-driven economy technology acts as a key enabler.

According to Romer (1986 : 1990) cited on the website of the Ministry of Economic Development (What is the Knowledge Economy?), knowledge in addition to labour and capital, has become the third element of production in the world's leading economies today.

3. The Digital Divide

Information and Communication Technologies are able to make a major impact on and contribution to human development across the world for those that have access, Kozma, McGhee, Quellmalz and Zalles (2004) point out. They expand by saying:

> *It can directly contribute to human capabilities by increasing people's ability to participate more actively in the social, educational, economic and political life of a community. It can also support economic growth through the productivity gains that it generates. Conversely, human*

> *development – particularly the development of a highly skilled workforce – can in turn contribute to technology development. Together these two developments can create a "virtuous circle" that can reduce poverty and improve the condition. (p. 361)*

In line with their observation, Dudley (2004, p. 25) is also of the opinion that Information and Communication Technologies can play a key role in the social and economic upliftment of a country and its people especially the African continent which he points out has been embraced by the New Partnership of Africa's Development (NEPAD).

This scenario, however, creates a utopian view as there are millions of people living on the African continent who have no access to, and probably will never have access to during their lifetime to ICTs.

Digital Dividends (2001) cited in Bridges.org (2001), state in their report:

> *…there are more telephones in New York city than in all rural Asia, more Internet accounts in London than in all Africa. As much as 80% of the world's population has never made a phone call.*

According to the United Nations Development Programme report (1999), cited in Kozma et al. (2004, p. 361), innovations in technological resources are creating material disparities between developed and developing countries in the world. Stilkind (1996) says the information revolution can be compared with a double-edged sword – to those that have access in the developing world it offers great opportunities. In contrast, those developing countries that have little or no access will fall further behind and will eventually become marginalized.

This divide that exists between those who have access ("the haves") and those who do not have access ("the have-nots") to ICTs is generally referred to in literature as the "digital divide".

Bridges.org (2001) points out that the digital divide can also be described as the differing imbalances that exist between countries that are in the fortunate position to reap the advantages of the information age and those who are not in the position.

The digital divide does not only exist between developed and developing countries in the world, but also exists between those who have "access" and those who do not have within the borders of a country, and among other things, in gender, physical disability, race and age (Bridges.org, 2001).

Charp (2001) describes the digital divide merely as:

> *…the gap in technology ownership and access between those who are affluent and those who are poor or live in rural areas with limited or no access to the Internet.*

The digital divide is a very complex issue and it is difficult to gain an overall understanding about what actually constitutes the divide and what the real problem is when there are so many definitions and descriptions of the digital divide. For purposes of this study, the divide can be described as the fact that some people:

> *…have the most powerful computers, the best telephone service and fastest Internet service, as well as wealth of content and training relevant to their lives... [An]other group of people do not have access to the newest and best computers, the most reliable telephone service or the fastest or most convenient Internet services. The difference between these two groups is…. the Digital Divide (U.S. Department of Commerce, 2000, cited in Noll, Older-Aguilar, Ross and Rosston (n.d.).*

It is apparent from the U.S. Department of Commerce's description that the digital divide refers to many aspects of Information and Communication Technologies that cannot easily be defined and measured. For example, how does one appropriately define "training relevant to their lives" and "most convenient Internet services"? Nevertheless, it seems that certain generalisations are encapsulated in this description and in most of the definitions and descriptions of the digital divide found in literature. These generalisations will now be discussed.

The digital divide is in a certain sense all about the lack of access to ICTs. It is this lack of access to ICTs, which has resulted in the digital divide between those who are fortunate to have access and those who have not.

Bridges.org (2001) emphasises that access entails more than just "computers" and connections. They are of the opinion that "real access" is:

> *…access that goes beyond just physical access and makes it possible for people to use technology effectively to improve their lives.*

The concept of "access" encompasses the acquisition and the utilisation of computer hardware and software to obtain relevant information on-line (Ba, 2005). Ba (2005) further points out that between the acquisition and utilisation aspects of access are other critical dimensions of access such as quality, affordability, tools as well as technical and educational support. In line with Ba (2005), Bridges.org (2001) believes that real access can only be facilitated when the following determining factors are appropriately addressed:

- Physical access – technology should be available and physically accessible;
- Appropriateness of technology – technology should be suitable for the specific circumstances;
- Affordability – technology should be affordable for the people using it;

- Capacity – users of the technology should understand (have the capacity and should be properly trained) to use technology for the purposes intended;
- Relevant content – information being accessed must be relevant with regard to content, language, etcetera;
- Social-cultural issues – limitations of use as a result of gender, race or other social-cultural factors should be appropriately eliminated;
- Trust – users of a particular technology should have confidence in the technology they use;
- Legal and regulatory framework issues – appropriate laws and regulations should be in force that are conducive to ICT utilisation;
- Local economic circumstances – local economies within which users utilise technology should be able to sustain the utilisation of technology.
- Macro-economic policies – national economic policies should be conducive and supportive to widespread technology utilisation;
- Political will – the required political willingness should be present at government level to do what is required for the successful utilisation of ICTs.

Another element that should be added to the above list, is what the Department of Education (2003, p.3) refers to as the sustainability of technology. The Department of Education (2003, p.3) explains that unless state-of-the-art technology is sustainable, it is of no real use to the user over time. These twelve determining factors need to be appropriately addressed to ensure that real ICT access can be accomplished in bridging the digital divide.

The main determining factors that facilitate real access to ICTs are depicted in Figure 12. The “Legal and regulatory framework” as well as the “Macro-economic policies” are the more important factors that have to be addressed at a national level by the government of a country.

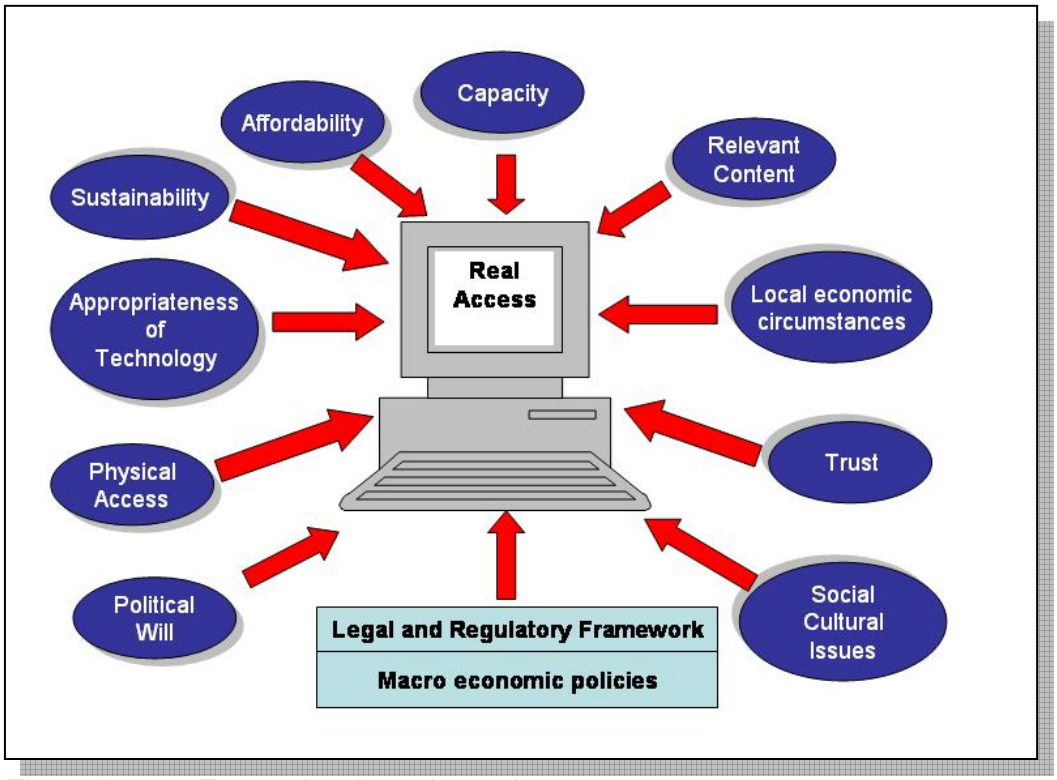

Figure 12: Factors that determine real access

Warschauer (2002), in line with the reasoning of Bridges.org (2001), points out that ICT access encompasses:

> *…far more than merely providing computers and Internet connections. Rather, access to ICT is embedded in a complex array of factors encompassing physical, digital, human, and social resources and relationships. Content and language, literacy and education, and community and institutional structure must all be taken into account if meaningful access to new technologies is to be provided.*

So, what is then the real problem and can the digital divide be overcome? Bridges.org (2001) report that there are many views on the digital divide problem each with its own connotation and focus. They explain the problem as follows:

> *Some argue that computers, connections and training will solve the problem, but there is disagreement about whether they should be provided by government, non-governmental organisations (NGO's) and the private sector, or the market will solve the physical access problem on its own. Others contend that government action (or inaction) hinders development and use of ICT….Many see beyond the physical access problem and focus on lost opportunity for people that are unable to effectively use ICT because they do not know how to use it or they do not understand how it can be relevant to their*

> *lives. Underlying social issues like basic literacy, poverty, and healthcare also loom large…*

They conclude that in fact, the digital divide is about all these aspects. A conclusion which seems correct as the digital divide is not a single thing but a complicated combination of fluctuating levels of access, basic usage and application of ICTs amongst countries, economies and people. At this stage there does not seem to be an easy formula to fix the problem either.

4. The role of education in bridging the digital divide

It was explained that technology is a very powerful force for change and the developments in Information and Communication Technologies over the last three centuries resulted in an information explosion and commensurate information age and knowledge-based economies.

It was emphasised that knowledge has become a critical factor in a knowledge-based economy. It was pointed out that economies that take advantage of the opportunities brought about by the innovations in ICTs are in the position to leapfrog economies which are not seizing the opportunities being offered.

It was further explained that the knowledge revolution brings with it the threat of an increasing gap between developed and developing countries in the world. This widening gap pertains to the disparities in access to information and knowledge that exist in the world which was described as the digital divide – a situation of information "haves" and information "have-nots."

The burgeoning pace of development in ICTs has exacerbated the divide between the developed and developing countries in the world. Avgerou (1998) explains:

> *At present, most developing countries are severely disadvantaged within a global economy which is increasingly more technology and information intensive: Unequal distribution of resources such as telecommunications and technical skills, causes concern about the ability of developing countries to participate in the emerging world economy. (p. 1)*

To explain the magnitude of this divide between Africa and the developed world, one needs only to consider the following statistics:

- New York City has more Internet host computers than the entire African continent which makes up 15 percent of the world's population (World Information Technology & Service Alliance, 2001);
- Africa has 2 percent of the world's total number of telephones and less than 0,1 percent of the world's total number of Internet users (McConnell International, 2000);
- In South Africa (the best-connected country on the African continent) 75% of schools had no telephone lines in 1999 (Mishpat.Net, n.d.).

The digital divide that exists within South Africa is exceptionally noticeable since the vast majority of South Africans (51,7%) live in developing or rural areas and only half of the rural population are literate (Polity, 1995).

The main reason for the digital divide that exists in South Africa, according to Singh (2004), from an educational perspective, is the fact that the "apartheid policy" of the previous regime promoted separate development which provided inferior education to the majority of the children in the past. Singh (2004) also adds that the divide is further attributable to the "high levels of poverty, lack of telecommunications infrastructure and high costs of connectivity" in South Africa.

Ifinedo (2005) points out that by large, the African continent is not a rich continent and despite its poor performance as a whole to link up with the world's knowledge-driven economy, all hope is not yet lost as many African governments are starting to realise (and some have already realised) the need to formulate appropriate policies to overcome the digital divide.

Ifinedo (2005) says that evidence suggests that South Africa has taken up the challenge to participate in a knowledge-driven economy and to prevent social exclusion by setting appropriate priorities in its development strategies and policies. In addition to these development strategies and policies, the following structures and mechanisms were also set in place by the South African Government to optimise the country's ICT utilisation in addressing the digital divide (Department of Education, 2003, p. 3):

- During 2001, the Presidential National Commission on Information Society and Development (PNC on ISAD) was established. The Commission was tasked to advise the Government on the optimalisation of ICT use in addressing South Africa's development issues and enhancing the country's global competitiveness;
- A Presidential International Advisory Council on Information Society and Development (PIAC on ISAD) was also established during 2001. The specific role of this Advisory Council is to advise the Government on the digital divide related issues. The following focus areas were identified:
  - Education;
  - Health; and
  - Small, medium and micro-enterprises (SMMEs).
- The Electronic Communications and Transactions Act of 2002.

The Electronic Communications and Transactions Act of 2002 (Department of Education, 2003, p. 3) is concerned with the development of a five year national e-strategy to enable and facilitate an electronic transaction process for the whole of South Africa, including the educational sector.

In their response to the digital divide, the Department of Education (2003) compiled their "Draft White Paper on e-Education" that specifically states that the concept of e-Education, from a South African perspective, is all about the utilisation of ICTs to accelerate the process of obtaining the national education goals. E-Education is not merely the process of obtaining computer literacy and developing skills to operate various ICTs, but it is rather the ability to:

- Access, analyse, evaluate, integrate, present and communicate through the application of ICT skills;
- Create knowledge and information through a process of adoption, application, design, invention and authorising of information;
- Operate in a knowledge-driven society by making use of appropriate ICTs and mastering communication and cooperative skills.

Current evidence pertaining to the utilisation of ICTs in education indicates that ICTs play a pivotal role in the transformation of education and training throughout the world. The transformation is all about a "shift from teacher-centred, task-oriented, memory-based education to an inclusive and integrated practice where learners work collaboratively, develop practices and develop creative thinking and problem solving skills" (Department of Education, 2003, p. 9).

The World Bank Group (2001) emphasises that any country's ability to benefit from the knowledge economy is dependent on how fast it can transform into a "learning economy". They explain that:

> *Learning means not only using new technologies to access global knowledge. It also means using them to communicate with other people about innovation. In the "learning economy", individuals, firms and countries will be able to create wealth in proportion to their capacity to learn and share. This requires fundamental shifts in formal education systems, where the focus needs to be on teaching people how to learn, as opposed to transmitting facts.*

5. Minimally Invasive Education

In South Africa it has become of vital importance to formulate new and bold solutions to overcome the digital divide as the vast majority of South Africans, living in developing and rural areas, do not have access to computers and are therefore mostly computer illiterate.

It is against this background that the Council for Scientific and Industrial Research (CSIR), in collaboration with the Department of Science and Technology (DST), launched their Digital Doorway projects throughout South Africa to evaluate the feasibility of Dr Mitra's "Minimally Invasive Education" training method. This method is based on a fundamental shift away from a teacher-centred approach to a learner-centred approach in education.

Minimally Invasive Education (MIE) is defined as:

> *A pedagogic method that uses the learning environment to generate an adequate level of motivation to induce learning in groups of children, with minimal, or no, intervention by a teacher (Mitra, 2003).*

Dr Mitra based MIE on the following hypothesis:

> *The acquisition of basic computing skills by any set of learners can be achieved through incidental learning provided the learners are given access to a suitable computing facility, with entertaining and motivating content, and some minimal human guidance (Smith et al., n.d.).*

Dr Sugata Mitra, head of the Centre for Research in Cognitive Systems (CRCS) at NIIT (National Institute of Information Technology) in New Delhi, India, conducted an experiment in 1999 which became known as the "Hole-in-the-Wall" experiment.

Dr Mitra was interested in determining if children, given unlimited, free access to computers and the Internet, would be capable of learning how to use a computer without or with little assistance or guidance. For this purpose he launched the "Hole-in-the-Wall" experiment (O'Connor, 2002).

According to Gush, Cambridge and Smith (n.d.) the objectives of Dr Mitra's "Hole-in-the-Wall" experiment were to determine whether:

- The desire to explore and children's natural curiosity would be the only necessary requirement for a person to learn new things;
- A person (child or adult) could teach himself basic computer skills by simply playing with the computer;
- Exposure to computers at a young age would improve children's basic skills and IQ (Gush et al., n.d.).

Adjacent to Dr Mitra's office at the NIIT, is the slum area of Kalkaji. On January 26, 1999 the first "Hole-in-the-Wall" computer kiosk was opened (see Figure 13). . A high-speed computer, connected to the Internet, was placed in the wall separating their building from the slum area. Children were immediately attracted to the machine installed on their side of the wall (O'Connor, 2002). The children's interactions at the computer were monitored by a remote computer and a video camera which was mounted in a tree close to the "Hole-in-the-Wall" kiosk (Judge, 2000). It was found that, the children quickly learnt how to point and click and by the end of the day the children were browsing the Internet (O'Connor, 2002).

Figure 13: "Hole-in-the-Wall": Kalkaji, New Delhi (Mitra, 2000)

The kids who visited the kiosk most frequently were children aged between 6 and 12, most of whom had little knowledge of English and only the most elementary education. These children were, however, capable of teaching themselves to browse on the Internet and to draw by means of the computer reports Judge (2000).

Mitra was curious to find out whether it was feasible, seeing children were capable of teaching themselves, to use the same teaching methods for children as those used for adults. Mitra believes that if children are capable of teaching themselves something, teachers could be used to teach children things which they cannot learn on their own (Judge, 2000).

According to Mitra, the most outstanding consequence of the hole in the wall experiment is that:

> *…once the kids have learnt a few operations they start teaching the same to other kids. And whenever one discovers a new, shorter, procedure they teach the same to other kids (Kalla, 2004).*

The advantage of the "Hole-in-the-Wall" experiment is seen in that it is not a teacher-driven or classroom-driven programme and that even children who do not attend school, can have access to the programme. Children experience the experiment as an adventurous game opposed to schools which they sometimes find boring. (Kalla, 2004)

Mitra (2003) points out that teachers and field observers have noted that these children that have been exposed to a computer kiosk, often show improvements regarding:

- School examinations, specially in subjects relating to computer skills;
- English usage and vocabulary;
- Attention span, concentration and problem solving techniques;
- Working collaboratively and practising self-regulation.

Mitra (2003) furthermore points out that the following learning processes were generally observed when children taught one another in using the computer:

- One child, observed by the other children, explores the Interface environment until an accidental discovery is made;
- The children who were observing, now asks the first child to allow them to repeat the discovery;
- While busy repeating the first accidental discovery, one or more children make more accidental discoveries;
- All the children now practice all the discoveries, making even more discoveries in the process. While making discoveries, they also create their own vocabulary to describe their experiences;
- They memorise the procedures followed for an operation (doing something) and they teach each other shorter methods for doing the same thing;
- The children divide themselves into two distinct groups: the “knows” and the “know nots”. They also realise that a child will be prepared to share knowledge in return for friendship;
- A stage is eventually reached where no further discoveries are made and the children continue practising what they have learned. At this stage intervention usually occurs and a new discovery is introduced followed by another self instructional cycle (Mitra, 2003).

Mitra and Rana (2001) found that during the self-instructional cycle, children actually formed impromptu classes where they taught one another.

The “Hole-in-the-Wall” experiments conducted since 1999 in India, have indicated that children between the ages of 6 and 13 are capable of teaching themselves how to use the computer. Mitra (2003) emphasised that this self-instruct ability of children is independent of their:

- Educational background;
- Literacy levels in English or for that matter in any other language;
- Economic or social level;
- Place of origin, that is town, city or village and ethnicity;
- Gender;
- Genetic background;
- Geographic location;
- Intelligence.

Judge (2000) claims that quite soon, adults who are computer illiterate will find it difficult to deal with practically everything in life. It has therefore become essential for today's children to be computer-literate. The "Hole-in-the-Wall" computer kiosks allows children to become computer literate

Mitra and Rana (2001) describe a computer literate child as a child who can:

- Switch a PC on;
- Use Microsoft Paint to draw a picture;
- Move objects using drag-and-drop, copy and delete, create folders, cut-and-paste and access programs using the shortcuts provided;
- Move from one web page to another and back; and
- Send and receive e-mail through a computer with e-mail functionality.

Judge (2000) is of the opinion that if the "Hole-in-the-Wall" computer kiosks are capable of inducing computer literacy, the current formal computer instruction models will have to be revised since it will be more appropriate for teachers to teach children something which they cannot learn by themselves.

Working in groups is essential in Minimally Invasive Education as the process depends on discovery and exploration. The main paradigm of MIE is collaborative constructivism as Mitra (2003) explains:

> *…children teach each other very effectively and are also effective at self-regulating the process. That is how over 100 children are able to use one computer.*

The phenomenal success of the "Hole-in-the-Wall" project has led Mitra to believe that public Internet kiosks should form part of every primary school where children are allowed to freely access and use the computers at their disposal (Mitra, 2003).

Mitra and Rana (2001) actually believe that children are capable of:

- Constructing their own knowledge;
- Assimilating new information;
- Changing their understanding in the light of new information;
- Developing critical insight into what they know about the world and how they think;
- Collaborating with other children and sharing their ideas instead of working individually.

In conclusion, it is important to point out that although the "Hole-in-the-Wall" project has been hailed by some researchers as a ground-breaking project that offers an alternative educational model, there are those who do not share the same enthusiasm.

Warschauer (2002) for instance, points out that visits to the "Hole-in-the-Wall" kiosk in India indicated that the Internet access was of little use to the users since it seldom functioned. He also mentions the fact that there was basically no specific organised involvement of any official community institutions to help run the computer kiosks. He furthermore points out that:

> *No special educational programs had been made available, and no special content was provided in Hindi, the only language the children knew. Children did learn to manipulate the joystick and buttons, but almost all their time was spent drawing with paint programs or playing computer games.*

Warschauer (2002) concludes by saying that:

> *…parents and the community came to realise that "minimally invasive education" was, in practice, minimally effective education.*

The empirical research component that will be conducted in this mini-dissertation will be performed within the context of Dr Mitra's Minimally Invasive Educational method that has been adopted by the CSIR in their Digital Doorway projects.

Chapter 3: Research Design and Methodology

1. Introduction

The first Digital Doorway installation by the CSIR, was in Cwili in the Eastern Cape in 2002. The aim of the Digital Doorway installations is to:

> *Provide people in rural and disadvantaged areas with computer equipment, and allow them to experiment and learn without formal training and with minimal external input (Smith et al., n.d.)*

In April 2005, the CSIR decided to install a Digital Doorway in Atteridgeville, a township adjacent to Pretoria. As a resident of Pretoria and a facilitator of ICT in a primary school in Pretoria, I decided to become involved in the project and do research with regard to what and how children are capable of obtaining computer skills without the guidance of a facilitator.

In this chapter it is proposed to discuss:

- The implementation of the Digital Doorway in Atteridgeville;
- The identification and compilation of the target population;
- An outline of the assignment given to the target population;
- The administration and activities performed regarding the obtaining of permission before field work could be conducted;
- The research purpose, methodology and data collection instruments used;
- How the research findings will be compiled and presented in Chapter 4.

2. Digital Doorway: Atteridgeville

The CSIR installed a Digital Doorway in Atteridgeville on 5 April 2005. The computer consisted of four terminals which would allow maximum use of the Digital Doorway as depicted in Figure 14.

Figure 14: Digital Doorway with four terminals

2.1 Hardware

The hardware, operating system and specifications of the computer installed at the Digital Doorway in Atteridgeville, are depicted in Table 3:

Table 3: Hardware components, operating system and specification of computer (Smith, Ronel "personal communication," April 22, 2005).

Hardware component	Description
Processor	Intel Pentium family of processors.
Operating system	Linux Mandrake 9.1.3. HP PC installation.
Memory	512MB PC2700 DDR333 DIMM.
Hard drive	40GB SMART III Ultra ATA/100 7200 rpm.
CD-ROM drive	48xCD-ROM drive.
Diskette drive	1.44MB diskette drive.
Graphics	1NVIDIA Qdro4 100NVS 64MB AGP DH card with VGA cable; 3NVIVIDA Qdro4 100NVS 64MB PCI DH card with VGA cable.
Network card	Integrated 10/100 Ethernet Broadcom BCM 4401.
Drive bays	(2) 5.25 External; (1) 3.5 External; (2) 3.5 Internal.

Hardware component	Description
External ports	6 USB; 2 PS/2; 1 parallel; 1 serial; 1 line in; 1 line out; 1 mic in.
Memory slots	4 DIMM slots
Keyboards	4 x Vandal proof Metal Keyboards (1 x ps2, 3 x USB) with integrated vandal proof touch pads.
Monitors	4 x HP or SAMSUNG 15inch LCD screens.

2.2 Software

Various software programs were installed on the computer at the Digital Doorway, including (Smith, Ronel "personal communication," April 22, 2005):

- Games (for example memory game, stickers game, letters learning game, etcetera);
- Open Office (writer, presentations, spreadsheet, etcetera);
- Educational software (for example TuxMaths, Geometry application, Stellarium Solar System Simulator, etcetera);
- Books and information which included categories such as agriculture, computers, crafts, history, etcetera;
- Short video clips.

During the installation the staff from the CSIR observed that the Open Office programs were not functioning properly. This meant that the prospective users visiting the Digital Doorway would be unable to use a word processing package. The CSIR rectified this problem within a week after installation. I was also a bit disappointed when I realised that there was no Internet connectivity at this Digital Doorway. The librarians, however, welcomed the fact that there was no Internet connectivity as they preferred the community to access the Internet from the library, which was available to them at a nominal fee of R5,00 for 15 minutes. The community were also capable of using a word processing package at the library at R5,00 for 15 minutes.

3. Identifying the target population

During a conversation with the librarians at the Saulsville library, they deemed it necessary for the community to be informed about the Digital Doorway especially of the fact that access was free of charge for the community. I thought it might be a good idea to contact the primary schools closest to the Digital Doorway and to introduce the school leaders to the Digital Doorway. By introducing the Digital Doorway to these children, it was believed that the news would spread further by word of mouth.

The primary schools closest to the Digital Doorway in Atteridgeville, were identified by consulting the librarians and studying a map of the area as depicted in Figure 15.

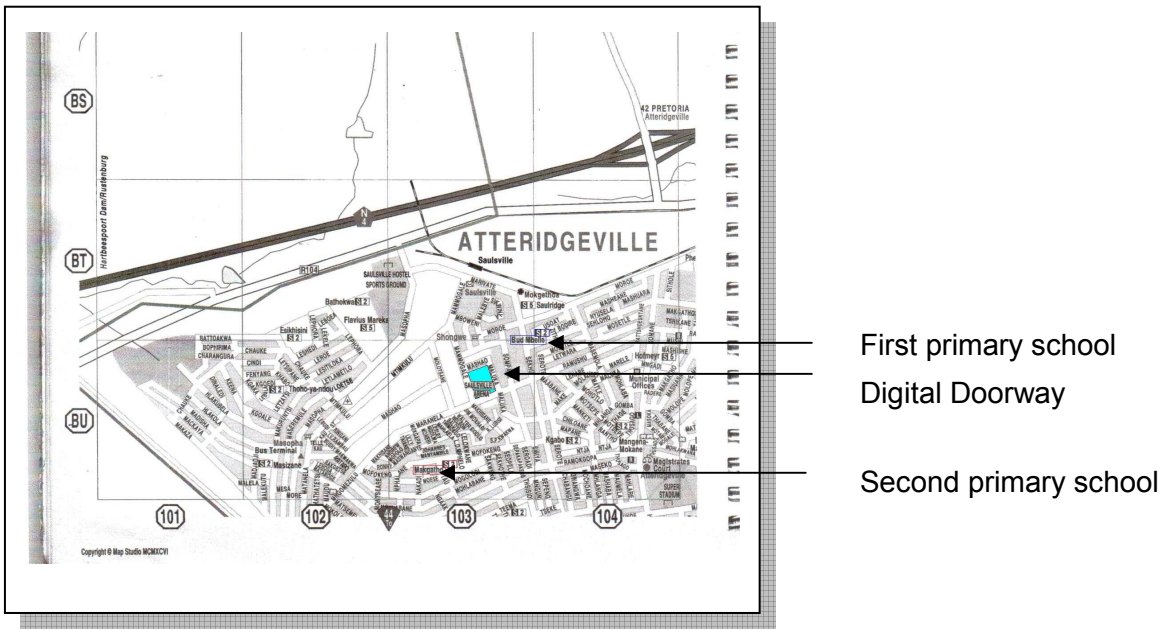

Figure 15: Primary schools closest to Digital Doorway in Atteridgeville (MapStudio, 1997/1998, p. 34)

The librarians at Saulsville community library were extremely helpful and provided me with the contact numbers of the identified primary schools. I contacted both primary schools on 6 April 2005. The principal of the first primary school was prepared to become involved in the research project and agreed to send the prefects of her school to the Digital Doorway to be introduced to the Digital Doorway at twelve o'clock on Wednesday 6 April 2005. The principal of the second primary school did not respond to my calls and it was therefore decided that the children of the first primary school would be used in the research project.

3.1 Target population

The group, who arrived at the Digital Doorway, consisted of four boys and four girls (as seen in Figure 16 and in Table 4). They were aged between 12 and 13 and were either in grade 6 or grade 7.

Figure 16: Target population

Table 4: Target population

Name*	Sex	Age	Grade
Sharon	Female	12	7
Verona	Female	12	7
Nomsa	Female	12	6
Zelina	Female	12	6
Sonny	Male	13	7
Vic	Male	12	6
Tommy	Male	13	6
Seppie	Male	12	7

**Fictitious names have been used to protect the identity of the target population*

After meeting these children, I decided to use this group as the target population for the research project.

3.2 Gaining and maintaining interest

As I was initially afraid that the children might soon lose interest in the project, I decided that the research project would be based on a competition. I suggested that the group divide in two and that they compete against each other over a period of a month to explore which group was capable of learning and obtaining the most computer skills during this period. The winning group would be announced at the end of the month after having discussions with the children on their progress on a weekly basis.

3.3 Compilation of competing groups

The children were requested to divide themselves into two competing groups. They immediately and unanimously decided to divide into a boys' and a girls' group, which I found quite naturally especially at their age.

3.3.1 Group name

The two groups were then requested to provide each group with a name. The girls found this assignment a bit difficult and battled to agree on a name, but eventually decided that they would be known as "Destiny's Child." The boys on the other hand, immediately decided that they would by known as "Bad boys."

3.3.2 Group leaders

The two groups, "Destiny's Child" and "Bad boys" were then asked to each elect somebody who would act as the leader of their group. The girls, again found this assignment very challenging and battled to elect and decide on a group leader. The girls eventually asked the boys to help them decide on a leader for the girls and once again the boys unanimously elected Verona as the group leader. The girls, however, still did not seem very happy with the boys' choice and eventually decided that they would take turns being the leader on a weekly basis.

The boys, on the other hand, found this task to be very easy and without hesitance decided unanimously that Sonny would be their leader. Vic initially felt he should be the leader of the group, but he was soon outvoted by the rest.

It was decided that the group leader would be responsible for completing a weekly schedule on the days and the length of time spent at the Digital Doorway, what the group had learnt during their visit to the Digital Doorway as well as any problems the group might have encountered with regard to the Digital Doorway. An example of the schedule can be viewed in Appendix 1.

4. Group assignment

As stated previously the assignment was based on a competition between the two groups and the winning group would be announced after a month of interaction with the computer at the Digital Doorway.

4.1 Procedure

It was expected of the group to:

- Interact with the computer at the Digital Doorway as frequently as possible;
- Report their progress to me on a weekly basis;
- Explain which computer skills they had obtained on a weekly basis;
- Explain how they had obtained these computer skills.

5. Introduction to the Digital Doorway

After discussing the project and their assignment with the children, I then accompanied and introduced them to the Digital Doorway as depicted in Figure 17.

Figure 17: Introduction to the Digital Doorway

The children were immediately interested in the computer and very enthusiastic to explore the capabilities of this "new machine". The children, however, had to return to school at that stage and I accompanied them back to their school as shown in Figure 18.

Figure 18: Target population on their way back to school

5.1 Obtaining permission

On arrival at the primary school the participants accompanied me to the principal's office. I introduced myself to the principal and obtained her permission to use the target population in the research project. The letter of consent is depicted in Appendix 2. Figure 19 depicts a photo of the principal and I.

Figure 19: The principal and me

Permission was obtained to interview; videotape and tape record the children the following day to explore what the children knew and were capable of doing on the computer at the onset of the Digital Doorway. This was deemed necessary to enable the researcher to answer the first critical question:

> *To what extent have children from a developing area obtained computer skills through the launching of the Digital Doorway project in Atteridgeville?*

This chapter will discuss the research methodology, research instruments and validation methods used for investigation at the Digital Doorway project in Atteridgeville.

6. Research purpose

The research was conducted to explore whether children were capable of obtaining computer skills successfully without the guidance of a facilitator during the Digital Doorway project in Atteridgeville, a developing area in South Africa. To answer this question, the following two critical questions had to be answered:

- First critical question

To what extent have children from a developing area obtained computer skills through the launching of the Digital Doorway project in Atteridgeville?

- Second critical question

How did these children obtain computer skills without the guidance of a facilitator during the course of the Digital Doorway project in Atteridgeville?

6.1 Research methodology

An empirical research was conducted to gather information and explore how children learn to use a computer, without the guidance of a facilitator, in a developing area in South Africa. A qualitative research method was therefore used to collect and analyse the data obtained from the participants. Data was obtained by means of:

- Semi-structured interviews;
- Focus group interviews;
- Observations;
- Video captured data;
- Tape recordings;
- Schedules.

6.2 Informed consent

In order to conduct the research, it was initially vital for me to obtain permission from the different parties who were to be involved. I therefore required it necessary to obtain permission from the following people or institutions:

- The CSIR to conduct the study and to use any material provided by the CSIR. A letter of consent from the CSIR is depicted in Appendix 3;
- The parents of the participants to use their children in the research project. A letter of consent from the parents is depicted in Appendix 4;
- The principal of the primary school which the target population attend. A letter of consent from the principal is depicted in Appendix 2.

The data collection methods and instruments to be used will be discussed separately underneath the appropriate critical question.

6.3 Restatement of the first critical question

Critical question: To what extent have children from a developing area obtained computer skills through the launching of the Digital Doorway project in Atteridgeville?

6.4 Data collection for and analysis of the first critical question

The following provides a brief summary of the questions posed during data collection and the data collection plan used for the first critical question:

6.4.1 Reason for the data collection

Data was collected to explore what the target population:

- Knew about a computer at the onset of the Digital Doorway;
- Were capable of doing on the computer at the onset of the Digital Doorway;
- Would like to do by means of the computer;

- Were capable of learning and teaching themselves within a period of a month after the installation of the Digital Doorway;
- Knew about the computer and different programs after interacting with the computer for a period of a month after installation.

6.4.2 Research strategy

Children were interviewed, by means of individual semi-structured interviews during the first week after the Digital Doorway was installed in Atteridgeville to obtain information on:

- Their knowledge of a computer;
- What they were capable of doing on a computer;
- What they knew about a computer's capabilities;
- What they would like to learn by means of the computer.

The individual semi-structured interviews were videotaped as well as tape recorded after receiving informed consent from the children's parents as well as the principal of the primary school the children attend.

The children were thereafter interviewed on a weekly basis by means of focus group interviews to determine what they had learnt during the week. This was deemed necessary as I wanted to ensure that the children visit the Digital Doorway as frequently as possible and to keep the children interested in the research project.

One month after the initial installation of the Digital Doorway, I conducted a final focus group interview with all of the participants. The focus group interview was once again video taped as well as tape recorded to explore whether the children:

- Had gained any additional knowledge of the computer;
- Were capable of doing more on the computer than during the first week after installation;
- Had gained any additional knowledge with regard to a computer's capabilities.

6.4.3 Sources of data

The principal of the primary school closest to the Digital Doorway in Atteridgeville was contacted by me and requested to send all her prefects to the Digital Doorway. I introduced these children to the Digital Doorway and they were encouraged to use the computer as frequently as possible.

The prefects of the specific primary school therefore became the source of data. The target population, as prefects of the school, were all grade 6 and 7 learners and either 12 or 13 years of age and the focus group interviews consisted mostly of all eight participants.

Individual semi-structured interviews were conducted with all eight participants and these children were also continuously part of the focus group interviews which were conducted on a weekly basis.

6.4.4 Venue for data collection

The individual semi-structured interviews were conducted at the primary school which the children attend.

The weekly focus group interviews were conducted in either the community library which was close to the Digital Doorway or at the primary school the children attend. I regarded these venues as a relatively safe environment in which to conduct interviews.

6.4.5 Frequency of data collection

Data was collected from 6 April 2005 until 6 May 2005 by means of:

- Individual semi-structured interviews conducted once during the first week after the installation of the Digital Doorway;
- Focus group interviews conducted on a weekly basis for a period of a month after the initial installation of the Digital Doorway to determine whether any learning had taken place during the course of the week.

6.4.6 Data collection instruments

Data was collected by means of:

- Individual semi-structured interviews;
- Focus group interviews;
- Observation;
- Video recording;
- Tape recording;
- Schedules.

6.4.7 Justification of data collection

The above mentioned data collection methods and instruments were used to:

- Determine what the children did at the computer and what they were capable of doing at the onset of a Digital Doorway as the video-captured data of the CSIR did not include screen captures;
- I thought it would be best to interview the children at the onset of a Digital Doorway to determine exactly what they knew and could do on a computer and then to interview them on a weekly basis to determine what they had learnt during the week;

- Enhance the validity of the method followed; the semi-structured interviews as well as focus group interviews were video taped and tape recorded.

6.5 Restatement of the second critical question

Critical question: How did these children obtain computer skills without the guidance of a facilitator during the course of the Digital Doorway project in Atteridgeville?

6.6 Data collection for and analysis of the second critical question

The following provides a brief summary of the questions posed during data collection and the data collection plan used for the second critical question:

6.6.1 Reason for data collection

Data was collected to explore:

- How the children learnt to use the computer in the Digital Doorway project;
- Which learning methods were used by the children;
- Where the children had initially learnt to use the computer.

6.6.2 Research strategy

Weekly informal focus group interviews were conducted with the participants (eight in total) for a period of a month after the initial installation of the Digital Doorway to explore how they had obtained computer skills or any additional computer skills.

6.6.3 Sources of data

The principal of the primary school closest to the Digital Doorway in Atteridgeville was contacted by me and requested to send all her prefects to the Digital Doorway and they were then introduced to the Digital Doorway by the researcher and encouraged to use the computer as frequently as possible. The prefects of the particular primary school therefore became the source of data.

The eight children who were initially interviewed by me at the onset of the Digital Doorway, once again became part of the focus group interviews which were conducted on a weekly basis. Most of the participants attended the weekly focus group interviews.

6.6.4 Venue for data collection

The data was collected at the community library as well as at the primary school the children attend as both were close to the Digital Doorway and regarded as relatively safe.

6.6.5 Frequency of data collection

Data was collected on a weekly basis for a period of a month after the initial installation of the Digital Doorway.

6.6.6 Data collection instruments

Data was collected by means of:

- Semi-structured interviews;
- Focus group interviews;
- Observations;
- Field notes;
- Video recordings;
- Tape recordings;
- Schedules.

6.6.7 Justification of data collection

Focus group interviews provided me with valuable information to determine:

- How the children were capable of teaching themselves how to use the computer without the guidance of a facilitator;
- Who taught them to use the computer;
- Which learning methods were used by the children to obtain computer skills.

This method was used to ensure that the children felt comfortable as they were always part of a group discussion and not in a one-to-one situation with me.

7. Research findings

In discussing the research findings I will specifically concentrate on the following:

- What computer skills the learners initially had when the Digital Doorway was installed;
- What additional computer skills they had obtained after a period of one month;
  - which programs were mostly used by the children and why.
- What prevented the participants from obtaining computer skills;
- Data obtained through the individual and focus group interviews would then be organised chronologically according to dates on which semi-structured interviews and focus group interviews were conducted;
- Data will be presented to the reader in:
  - tabular format;

- electronic format.

After discussing the semi-structured as well as every focus group interviews conducted, watching the video recordings and listening to the tape recordings, I made a summary of what I had found during the interviews. All the data was then transcribed, coded and categorised using Microsoft Word and Microsoft Access.

The findings of the individual interviews as well as weekly focus group interviews are presented in detail in a narrative format in Chapter 4. A synthesis of the findings is addressed in Chapter 5.

Chapter 4: Findings

1. Introduction

The target population identified for the research project, consisted of four girls, aged 12 and four boys, aged between 12 and 13. It was decided, as discussed in Chapter 3, that the girls' group, referred to by themselves as "Destiny Child" would compete against the boys' group, known as "Bad boys" to see which group was capable of teaching themselves most at the Digital Doorway during a period of a month.

After obtaining permission from the principal of the primary school which the target population attend, I entered the field and conducted the first individual semi-structured interview with the participants on 6 April 2005 at the primary school. The purpose of the individual semi-structured interviews was to determine what they knew about a computer at the onset of the research project, their usage or non-usage of a computer, their knowledge of a computer's capabilities and their exposure and access to computers. After the initial individual interviews, I conducted weekly focus group interviews with the two groups to monitor their progress.

In the chapter to follow, I will endeavour to provide the reader with a factual account in a narrative format on the research findings with regard to the Digital Doorway installed in Atteridgeville. The findings will be presented in the following chronological order:

- Individual semi-structured interviews;
- Weekly focus group interviews (which will be conducted separately with the boys' and the girls' groups);
  - Summary of findings after every focus group interview conducted;
  - Possible solutions to the problems experienced by the target population;

The chapter will conclude with an overview of the findings.

2. Individual semi-structured interviews

To explore what the target population was capable of doing on a computer at the onset of the research project, I deemed it vital to conduct individual semi-structured interviews (see Appendix 5 for questions posed to participants) to enable me to eventually answer my first critical question:

> *To what extent have children obtained computer skills through the launching of the Digital Doorway project in Atteridgeville?*

Semi-structured interviews were conducted in the staffroom of the primary school the children attend, during school hours. The principal was at first reluctant to allow the children to be interviewed during school hours as she felt that the children would lose valuable

academic time. She did, however, eventually give her consent after being assured that the interviews would only last up to ten minutes per child. I thanked the principal and staff for their co-operation by providing them with chocolate cake during break.

All four girls of the Destiny's Child group and three members of the Bad boys group were interviewed. The boys' group leader was absent on the specific day as he, according to the other children, had gone with his parents to apply for a passport to travel to Brazil. I eventually interviewed the group leader during the follow-up meeting which was scheduled for the following week.

2.1 Biographical information

Each individual semi-structured interview was initiated by asking the participant if he/she had a best friend at school that they confided all their secrets to. All of the children, except one, replied that they had a best friend in whom they could place their trust. The one who did not have a best friend explicitly told me why he did not have one:

Researcher:	*Do you have a best friend at school?*
Seppie:	*(thinks and then shakes head) No.*
Researcher:	*Tell me, when you have a best friend, do you tell them all your secrets?*
Seppie:	*No (seems quite sure of himself).*
Researcher:	*No, why not? Why don't you tell them your secrets?*
Seppie:	*Because they go and tell everybody.*

I told the children that I wanted to be their friend during the course of the research project and that they should feel free to confide in me. I undertook to be worthy of their trust.

To determine what these children's setup at home was, it was important to obtain certain biographical information from them. I conducted semi-structured interviews to obtain this information from the children. See compact disc provided for transcribed individual semi-structured interviews.

2.2 Biographical questions

The children were asked several biographical questions mainly to determine what their families and homes looked like and to a certain extent determine the social-economic position of the family. Biographical information was obtained from the children with regard to the following:

2.2.1 Age and gender

- The children's ages varied between 12 and 13 years. Six of the children were 12 and 2 were 13;

- There were four boys and four girls in the group;
- Both the children, who were 13, were boys.

2.2.2 Parents and their occupations

- Four of the children either did not have fathers or their fathers did not stay with them;
- The remaining four children's fathers stayed with them and were all employed;
- The children all had mothers;
- Four of the children's mothers had jobs; the mothers of the other four were unemployed;
- Two of the children's mothers who were unemployed, did not have fathers either.

2.2.3 Siblings

- There was an average of 3.75 children per family;
- Vic was an only child and liked being the only child as seen in the following quote:

Researcher:	*Do you have a mother?*
Vic:	*Yes.*
Researcher:	*And brothers?*
Vic:	*No. I am only one.*
Researcher:	*Are you the only child?!*
Vic:	*Yes.*
Researcher:	*But then you are spoilt!*
Vic:	*(Smiles) Yes…*
Researcher:	*Does your mother spoil you?*
Vic:	*Yes.*

2.3 Open-structured questions

After establishing the children's biographical background, I asked them several open structured questions with regard to the availability of computers in their homes, their exposure to computers, their usage or non usage of computers and their knowledge of computers.

The children were asked and responded subsequently to the following questions:

2.3.1 *Prior exposure*

- Four of the children (two boys and two girls) interviewed indicated that they were familiar with the use of a computer;
- Four of the children (two boys and two girls) indicated that they did not really know how to work a computer, but the answers obtained from the children indicated that they were capable of performing basic functions as stated in the following quote:

Researcher:	*Ah, good. Tell me, do you know how to use a computer?*
Seppie:	*I know a little bit.*
Researcher:	*Little bit? So you don't really know much?*
Seppie:	*Yes.*
Researcher:	*Alright. And where did you learn how to use it a little bit?*
Seppie:	*I know, pool, I do games.*

2.3.2 *Prior experience*

- Sharon said that her father and mother had taught her how to use the computer, but she also attended Saturday school at St Mary's DSG the previous year and they did work on the computers;
- Zelina said that she had an older sister of 24 who had taught her how to use the computer;
- Sonny said his father had taught him how to use a computer and that his father had his own laptop;
- Vic said his cousin showed him how to work the computer as stated in the following quote:

Researcher:	*Where did you learn to use it a little bit?*
Vic:	*At my cousin.*
Researcher:	*Right.*
Vic:	*There's a computer.*

2.3.3 *Access to computers*

Three of the girls (Sharon, Verona and Zelina) and one of the boys (Sonny) indicated that they had a computer at home.

2.3.4 *Usage of computers*

The answers obtained from the children, indicated that they mainly used the computer for the following purposes:

- Games (six children);
- Typing words (three children);
- Printing (three children);

The following quote confirms what the children generally do on a computer:

Zelina:	*Then every time we play and we print when we want to do something (wrings hands).*
Researcher:	*And then?*
Zelina:	*We print, we print then we play games.*
Researcher:	*Okay, so you print and you play games. Did your sister teach you?*
Zelina:	*Yes, she only teach me when she know something (wrings hands).*

2.3.5 *Anticipated computer knowledge*

The answers obtained from the children clearly indicated that they would like to use the computer for the following purposes as also indicated in a quote taken from Nomsa:

- Music (two children);
- Printing (one child);
- Typing words (four children);
- Drawing (one child);
- Games (two children).

Researcher:	*Tell me what would you like to do on the computer?*
Nomsa:	*I want to print.*
Researcher:	*Okay and what else?*
Nomsa:	*And play games.*
Researcher:	*Print and play games.*

Nomsa: *Yes.*

Researcher: *Fine.*

Nomsa: *And also typing (shows with fingers as though she is typing).*

2.3.6 Usage of computer at the Atteridgeville Digital Doorway

All of the children, except Tommy, were convinced that they would be able to teach themselves how to use the computer at the Digital Doorway. The reason why Tommy thought he would not be capable of learning how to use the computer was:

Researcher: *Do you think you will be able to teach yourself how to use this computer, the Digital Doorway that I showed you yesterday?*

Tommy *No (shakes head from side to side).*

Researcher: *Don't you think you will be able to teach yourself?*

Tommy: *(Makes negative sound and shakes head).*

Researcher: *Why not?*

Tommy: *No one is teaching me the computer.*

The other children were all confident that they would be able to teach themselves as one claimed that:

Researcher: *Do you think you will be able to teach yourself how to use this computer?*

Sonny: *Yes, I...*

Researcher: *Why do you think you will be able to teach yourself how to use this one?*

Sonny: *Course, hmmm…it's, it's…it's almost like a computer, it's like my father's laptop, cause at home we use a laptop, and the mouse...*

Researcher: *Okay?*

Sonny: *You move your finger around…*

Researcher: *Yes, okay, then it is the same as this one.*

Sonny: *Yea.*

2.3.7 Knowledge of computer's capabilities

The children mostly did not know anything about a computer's capabilities as clearly indicated in the following quote:

Researcher:	*Okay, now, hmm.. what would you like to be able to do on the computer? Is there something else you would like to be able to do?*
Sonny:	*Hmm…*
Researcher:	*That you don't know that you want to do on the computer?*
Sonny:	*Hmm, I don't know, because I don't know much about the computer, hmmm…I don't know what is in the computer.*

Some of the children knew that the computer was used by their fathers and mothers, but could not explain exactly what they used the computer for as depicted in the following quote:

Researcher:	*What do you think a computer is really capable of doing?*
Sharon:	*Hmm, I think it's (smiles) it's capable of doing work for our mothers and fathers.*

Some children did, however, provide me with the following information:

Researcher:	*And what do you think the computer can do?*
Vic:	*E-mail something from….*
Researcher:	*And what do you think the computer is capable of doing? What do you think a computer can do? What is it you can do with a computer?*
Nomsa:	*Hmmm….*
Researcher:	*Do you think computers can do lots of things?*
Nomsa:	*Yes, lots of things.*
Researcher:	*Such as what? What do you think?*
Nomsa:	*Sending messages.*
Researcher:	*And what do you think the computer can do? What can one do with a computer? What else is there? You said you can type words on it and you can play games, but what else can a computer do? Do you know of anything else a computer can do?*
Seppie	*You can get information from it.*

Researcher:	*Okay, good. So you can get information, that's a clever answer! What else?*
Seppie:	*Aaah….aaaahhh….*
Researcher:	*Is that what you can think of? But that's a clever answer.*

At the end of every interview I thanked the participant for his/her valuable contribution and gave him/her some Fizzers which he/she accepted with a smile.

I arranged to meet the participants on a weekly basis at either the community library or at the primary school they attend. I provided each participant with a letter requesting permission from their parents to use these children in the research project as well as a schedule indicating the venues, dates and times for the rest of the interviews (as depicted in Appendix 4).

The children were requested to visit the Digital Doorway as frequently as possible, to explore the computer as a group and to see what they were capable of teaching themselves at the Digital Doorway. They were also expected to complete a weekly schedule with regard to what, when and how they had learnt as well as any problems they had experienced during their visits to the Digital Doorway (see Appendix 1 for an example of the weekly schedule).

2.3.8 Summary of findings

At the conclusion of the individual interviews, I realised that all of these children had already at some time or other been exposed to a computer. Some of them already had a working knowledge of the computer and some even had computers at their disposal at their homes or were capable of accessing a computer elsewhere.

The information obtained from the participants during the interviews indicated that these children's parents or other family members mostly taught them how to use the computer. None of the children mentioned that they had gained any computer skills at their school or from a teacher, although they had a fully equipped computer centre at their school. When I asked the principal whether they teach the children any computer skills at school, she replied that the teachers were not capable of teaching the children as they had not yet received any training from the Department of Education although their computer centre was installed at the end of 2002.

Although some of these children had a working knowledge of the computer, most of them had no idea of what a computer's capabilities were. It was obvious that the children all enjoyed playing games on the computer and for some reason or other they regarded the computer's ability to print their work as very important.

3. Focus group interviews

To enable me to answer my two critical questions eventually, to maintain their interest, to motivate them and to stay involved with the group, I decided to conduct weekly focus group interviews with firstly the girls' group and then secondly the boys' group. The groups met on

a weekly basis for a period of a month, either at the community library or at the primary school they attend.

3.1 First focus group interview

The first focus group interview was conducted on Thursday 14 April 2005 at the community library. I contacted the librarians as well as the principal of the primary school the children attend early on Thursday morning 14 April 2005, to confirm the appointment with the children. The girls were scheduled to meet me between 15:00 and 15:30 and the boys between 15:30 and 16:00.

3.1.1 Focus group interview: girls

All the girls arrived on time at the community library. Before I, however, had time to question the girls with regard to the progress they had made at the Digital Doorway during the week, they bombarded me with the following problems which they had encountered as depicted in the following quotes:

Sharon:	*The computer was shut down.*
Researcher:	*Why was it shut down?*
Verona:	*Thursday*
Sharon: (rubs eyes and forehead constantly)	*I don't know…*
Sharon (looks at Verona and says)	*Yes, Thursday.*
Researcher:	*Is it?*
Sharon:	*Yes.*
Researcher:	*Did you go to the computer and was it ...was everything blank?*
Sharon:	*Yes, it was blank.*
Researcher:	*And did you come and tell the ladies at the library?*
Verona:	*Yes, we tell them after and then they come to…*
Sharon:	*when it was jammed, we came inside and we come and ask them to... (shows turning of key with hand)*
Researcher:	*Reset it?*
Sharon:	*Yes and then after that they tried and it was, they couldn't…nothing happened.*

Researcher: *So it wasn't working?*

Sharon: *Yes (has netball on lap and presses with hands on netball)*

The girls also seemed to experience several other problems accessing the computer when it was in a working condition, as children who were not part of the research project, prevented them from access to the computer as Verona reported:

Verona *And it is not just like the computer jammed, it is too full and they don't want us to touch the computer*

Researcher: *Now who was there? Who didn't give you…?*

Verona: *Children from schools*

Researcher: *From which school, do you know?*

Verona: *No.*

Researcher: *The high schools…*

Verona: *High schools, others they stay…*

Researcher: *Okay. Then you must tell them you also want a turn to work there. Right?*

Verona: *(Nods head)*

Some of the girls also had a hectic social and extra-mural program and found it difficult to always practise at the Digital Doorway, as Sharon explained:

Sharon: *No, on Friday we came then it was blank then on Saturday, on the weekend I couldn't come, because on Saturday I went to school for portfolios and then I had to go to my mother's and then on Sunday we had to go to her house (points to Verona who is sitting on the same chair as Sharon), cause she was, there was something like a party at her house...*

Researcher: *At whose house?*

Sharon: *(points to Verona)* *at her house, because it was her birthday yesterday.*

During the whole conversation it became apparent to me that the girls did experience several problems visiting the Digital Doorway. Sharon, however, decided to do something about the situation and took the initiative and proved to be very assertive by requesting the following:

Sharon: *Can we please have your phone numbers?*

Researcher: *My phone number?*

Sharon: *Yes.*

Researcher: *Yes, I'll give it to you.*

Sharon: *So that when we have a problem we can phone you.*

I reminded the girls that they were competing against the boys and if they did not go to the Digital Doorway to explore the computer, the boys would beat them in the competition. The girls were, however, quite confident that the boys had not been to practise either as they reacted by saying:

Sharon: *Ah, I don't think the boys will, because so far my cousin, Sonny, was sick.*

Researcher: *Was he sick?*

Sharon: *Yes, he was, for like four or three days.*

Researcher: *What was wrong with him?*

Sharon: *Hmm, it was something like being, like having hmmm…hmmm… heartburn.*

Researcher: *Okay. Didn't he come to school? `*

Sharon: *No, he wasn't coming to school. Then he started coming to school on like, on like Wednesday, today.*

Researcher: *Now is he better?*

Sharon: *Yes.*

Researcher: *So you don't think they've been training at the computer?*

Sharon: *Yes, I think so. (with the yes, she is actually denying that they have been practising).*

I reminded the girls that they should once again appoint a group leader for the coming week and Sharon immediately opted for the position which was unanimously agreed by the rest of the group. I experienced her as intellectually, emotionally and physically superior to the rest of the girls. She was also the self-appointed spokesperson for the group.

Before leaving the girls handed me their completed schedule of the times they spent at the Digital Doorway during the past week (see Appendix 6 for completed schedule for week 1). I thanked the girls for their co-operation and participation and gave each a lollipop which they of course gladly accepted.

I was just about to conduct the interview with the boys, when I was once again confronted with another problem which one of the girls was experiencing. Sharon returned just after

they had left and asked me if I perhaps had R3,00 for Zelina for a taxi as she was unable to get home as she had no means of transport. I also became aware of a conversation that the girls were having amongst themselves with regard to Zelina's safety who initially wanted to walk home. The girls eventually convinced her that a taxi would be the safest option. It was obvious that the girls were not only experiencing problems in accessing the Digital Doorway, they were also experiencing problems with regard to getting to and from the Digital Doorway.

3.1.2 Focus group interview: boys

The boys were very slow to arrive and initially I thought that only two of the group members, Vic and Tommy, would attend the focus group interview. The group leader, Sonny, eventually arrived after a while. During the conversation with the boys, it became apparent that they too, had not really been to work at the Digital Doorway. Vic was the only one that did go, but I realised that he only did on the computer what he already knew he could do, as he reported:

Researcher:	*What did you do?*
Vic:	*I played games only (lies backwards in chair).*
Researcher:	*And what game did you play?*
Vic:	*That card one's.*
Researcher:	*Cards?*
Vic:	*Yes.*
Researcher:	*What did you do with the game? What can you do with it?*
Vic:	*The rules of the game is you must pack the cards by numbers.*
Researcher:	*Okay, alright and could you do it?*
Vic:	*Yes.*
Researcher:	*How did you work? With the mouse or what?*
Vic:	*Ha…?*
Researcher:	*Did you work with the mouse?*
Vic:	*Yes.*
Researcher:	*Now who showed you how to play the game?*
Vic:	*At my cousins.*
Researcher:	*So you played the same game you played at your cousin's house?*

Vic: *Yes.*

I initially only had a focus group discussion with Vic and Tommy who had arrived on time for the interview. After conducting the focus group interview with these boys, the whole group of girls returned, very excited, escorting the boys' group leader to the library. It was then found during the following interview with the boys that they too experienced several problems with regard to their proposed visits to the Digital Doorway. The problems mentioned by the boys were similar to those experienced by the girls. Tommy, like Zelina, apparently stayed quite a distance from the Digital Doorway and when he was asked if he had been to practise at the Digital Doorway, he replied by saying:

Tommy: *But my home is far…*

Researcher: *Is your home far away?*

Tommy: *Mmmm…*

Researcher: *Do you stay as far as Zelina?*

Tommy: *Mmmm…*

Researcher: *So you are not close to the computer?*

Tommy: *Yes.*

Sonny went to the Digital Doorway to practise on the computer, but he experienced the same problem as some of the girls had mentioned during my focus group discussion with them:

Researcher: *And did you go and practise this week?*

Sonny: *Yeees, no I practised at home, because here it was full.*

Before leaving, I asked the boys for their completed schedule, but they were unable to provide me with theirs. I thanked them for their co-operation and handed them some lollipops as well which they gladly accepted.

3.1.3 Summary of findings

At this stage it became clear to me that both groups of children experienced different problems with regard to their visits to the Digital Doorway. The problems with the computer can be summarised as:

- The computer freezes (I found that the computer did not jam as stated by the girls, but too many applications were generally opened by different people visiting the computer kiosk, which resulted in the computer freezing);
- The Digital Doorway was too full and crowded with people;

- The people working on the Digital Doorway, mostly older children, did not give the target population a chance to work on the computer.

The other problems which became apparent during the focus group discussion, was of a more personal nature and can be summarised as follows:

- Some of the children stayed too far away from the Digital Doorway and transport was therefore a problem;

- Some of the children seemed to have a hectic extra-mural program.

3.1.4 Solutions to the problems

I listened to all the problems experienced by the children and tried to solve some of them by doing the following:

- I asked the librarians to visit the computer kiosk at regular intervals and to reset the computer if necessary, which they agreed to do;

- I contacted the CSIR and asked them to place a notice on two of the terminals to reserve these for children fifteen years and younger between 14:00 and 17:30, which they agreed to do.

I once again encouraged the children to visit the Digital Doorway as frequently as possible and asked the group leaders to complete a schedule of their visits to the computer kiosk for the following week. It was agreed that the groups would once again meet me the following Thursday, 21 April 2005, at the community library to discuss the progress they had made during the week.

At this stage I became very anxious as it seemed as though no apparent learning was taking place. I therefore decided to rethink the assignment and made a few adjustments for the following sessions which would be discussed in the findings of the second focus group interview (see 3.2.4).

3.2 Second focus group interview

The second focus group interview was scheduled for Thursday 21 April 2005 at the community library. I contacted the librarians as well as the principal of the primary school the children attend telephonically, on Wednesday 20 April 2005 to confirm the appointment. The children, who had returned their signed letters of consent, were all contacted by SMS to confirm the appointment.

The girls were once again scheduled to meet me between 15:00 and 15:30 and the boys between 15:30 and 16:00.

I arrived well ahead of time, but as time went by, I became worried as nobody turned up for the appointment. When none of the girls had yet arrived at about 15:10, I was quite stressed. I thought there might be a conspiracy against me and that they had all decided to quit and not arrive at all! I eventually walked to the Digital Doorway to determine if they were

not perhaps working there, which I very much doubted in any case. The outing to the Digital Doorway proved, however, to be very fruitful as I made quite a few interesting discoveries:

- Two of the terminals were black. At first I thought it was just a screen saver, but they were just dead!
- The usernames and passwords, put up by the CSIR, to enable the people to access the computers, were off;
- The notices put up by the CSIR to restrict the use of two terminals for children 15 years and younger between 14:00 and 17:30, were removed and nowhere to be seen;
- There were about five children at the computers, one aged about 11 years and the rest all much smaller – they all had to stand on the steps to reach the terminals!

I was now experiencing some of the problems of the Digital Doorway that the children had mentioned to me earlier.

3.2.1 Focus group interview: girls

Back at the community library, I once again waited for the girls to arrive. Sharon, Verona and Nomsa eventually arrived at 15:20. I was very glad to see them! According to the girls they were late as they had played a netball match that afternoon. Zelina did not arrive and according to the girls they believed it was because she stayed too far away and therefore had transport problems getting back home from the library.

It was interesting to hear what the children had to say. They did work on the computer during the week – see Appendix 7 for completed schedule for week 2. They showed Nomsa what one should do if one wanted to print, but according to Nomsa she would not be able to print as indicated in the following quote:

Researcher:	*But Nomsa, if you go to that computer now, will you be able to do what they showed you?*
Nomsa:	*(shakes head in denial) No.*
Researcher:	*No, not yet?*
Nomsa:	*Yes (meaning no she won't be able to).*

Sharon and Verona worked on a geometry program, which Verona discovered on the desktop. Although she discovered the program, she was unable to access the program as she did not have the know-how. Verona was very excited that she had discovered the geometry program, but admitted that she was unable to access it herself and therefore had to call Sharon as seen in the following quote:

Verona:	*Sharon isn't showing me everything.*
Researcher:	*Isn't she showing you everything?*

Verona:	*No (very excited), the geometry I show, it's me…*
Sharon:	*She's the one who saw the geometry…*
Verona:	*It's me..!*
Researcher:	*Good, but did you open it yourself or did Sharon go and show you how to open it?*
Verona:	*No me, I call Sharoniswe, this is a geometry that we do at the school, so she opened it.*
Researcher:	*Who opened it?*
Verona:	*Sharon.*

Geometry was something which was familiar to Sharon and Verona as they both did it in mathematics at school. Asked whether they had liked working on the specific computer program, I received the following answer:

Researcher:	*So this was the first time you could do it on the computer?*
Sharon:	*Yes.*
Researcher:	*Do you prefer working on the computer than at…*
Sharon:	*No.*
Researcher:	*The sums at school?*
Sharon:	*No, the sums at school (smiles).*
Researcher:	*Why do you like the sums at school?*
Sharon:	*It is because it's a challenge, on the computer it is like you just print. You have to think when you write it down, when you make a mistake at least you have to scratch or do something right, excuse or stuff like that. On the computer you just do it and you know it's not a challenge, it's like…*
Researcher:	*So you say that program isn't really a challenge for you?*
Sharon:	*Yes (Verona also nods head).*
Researcher:	*Good, but did you like working on it or not really?*
Sharon:	*Not really.*
Researcher:	*Not really, so it wasn't that interesting?*
Sharon and Verona:	*(nod heads)*

Researcher: *And other ones there?*

Sharon: *I like working on the book, cause the teacher is like so good, cause she gave us work today, she won't take it tomorrow, she is going to give us a challenge to finish it even although you not finish, she is going to give you a challenge.*

As indicated in the following direct quote Sharon did not enjoy the geometry program, she preferred a teacher. She provided me with the following simple, but interesting information:

Researcher: *So you prefer a teacher in the classroom…?*

Sharon: *Yes, to tell you that you did this wrong, you have to correct it, write the corrections and stuff like that.*

Researcher: *Good, and what's good about corrections?*

Sharon: *Corrections? Like in the computer, like you go into a file and then it could get erased and then your book, nothing can get erased, because it is ink, in the exams you can study from it…*

Sharon also discovered a short video clip on the Digital Doorway about fish, which she enjoyed watching. The other girls' body language indicated that they were not really convinced that she had watched a video clip as they did not seem to know about it as depicted in the following quote:

Researcher: *Okay, good. Now what did you scroll through that you saw was interesting?*

Sharon: *Oh, it's this, it's this file it shows like something, like a movie, but it is a short movie, it shows fishes, it shows fish very beautiful fish, but it is slow motion…*

Researcher: *Good, so you found that?*

Sharon: *Yes.*

Researcher: *Who did you show it to?*

Sharon: *A lot of people, because every one was doing…*

Researcher: *Okay, did you show Verona?*

Sharon: *Yes (Verona however shakes her head in denial).*

Researcher: *(Addressing Verona) Did you see it?*

Verona: *No (at this stage Sharon looked at Verona in disbelief and asked her something which was inaudible).*

Researcher: *(Addressing Nomsa) And Nomsa, did you see it, or weren't you there?*

Nomsa: *(shakes head in denial and then again nods head)*

The girls once again indicated to me that they had experienced several problems when visiting the Digital Doorway as depicted in the following quotes:

Sharon: *Hmmm, we first learnt, we first…on Friday we couldn't do anything, the things couldn't work, we don't know why…*

Researcher: *Were the computers off?*

Sharon: *Mmmm…*

Researcher: *Did you tell the ladies (points to counter in library)?*

Sharon: *No, we didn't, cause they told us it's a problem, cause every time they try and fix it (shows resetting of computer with hands), it doesn't work.*

When, however, the Digital Doorway was once again functioning properly, the girls experienced further problems with the computer as depicted in the following quote:

Sharon: *We have a problem now, the enter button doesn't work.*

Researcher: *Doesn't the enter button work?*

Sharon: *No, even though…*

Researcher: *On the one that you worked on?*

Sharon: *No, every.*

Researcher: *All of them?*

Sharon: *Yes, all of them even though we tried pressing anything.*

Researcher: *Is it?*

Sharon: *The enter button doesn't work.*

When the girls were once again able to work on the computers, the bigger boys prevented them from working on the computers. They claimed the boys bullied them, and would not allow them to work on the computers. The boys did not believe them either when they told them they had to work on the computers as explained in the following quote:

Sharon: *Yes, because the boys bothering us, there's people like no you're, she didn't send you, you lying you just want to go on to the computers and stuff like that.*

Researcher:	*Now were they older than you?*
Sharon:	*Yes (very sure about herself).*
Researcher:	*Big boys?*
Sharon and Verona:	*Yes.*
Researcher:	*So they didn't really want you to work…*
Sharon:	*Even though they read that note…*
Researcher:	*Yes…?*
Sharon:	*They wouldn't go out, they would just stay there.*
Researcher:	*Yes…?*
Sharon:	*They were over 15.*
Researcher:	*So they weren't really allowed…*
Sharon:	*Yes.*

During the focus group interview conducted with the girls, I once again became aware of the fact that there was a cultural divide which exists within the South African context. The different sets of values become clear in the following conversation:

Sharon:	*So how are you going to, hmmmm….celebrate your…hmmm...what is it…? Ten years, eleven years democracy?*
Researcher:	*Democracy? Is that what you are celebrating now?*
Sharon:	*We are celebrating it on Wednesday in Jo'burg.*
Researcher:	*Is it?*
Sharon and Verona:	*Yes.*
Researcher:	*Oh yes, Wednesday, you're going through to Jo'burg?*
Sharon:	*Yes*
Researcher:	*No, I am working on Wednesday; I have a lot of work to do.*
Sharon:	*Shame!*

I also realised that although these girls stayed in Atteridgeville, a township which forms part of the bigger Tshwane Metropolitan area, they were not really exposed to the rest of Tshwane as depicted in the following quote:

Sharon:	*Which school are you teaching at?*
Researcher:	*I teach at Laerskool Menlopark. Have you heard of that?*
Sharon:	*No.*
Researcher:	*It is in Menlo Park, close to Menlyn, Menlyn and Brooklyn? Do you know that?*
Sharon and Verona:	*No…*
Researcher:	*You don't know where that is?*
Girls:	*(shake heads in denial).*

I found it quite disturbing that the girls did not even know where Menlyn Shopping Centre was, as it is the biggest shopping centre in Pretoria and most likely one of the biggest shopping centres in South Africa.

At the end of the focus group interview, I thanked the girls and gave each of them a container of lip balm. They were very excited about the gift and said that they usually look at the lip balms and nail polish when they visit the malls.

I asked them to once again visit the Digital Doorway as frequently as possible during the coming week and decided to give them an assignment for the coming week. They had to find and explore the following two programs during the week:

- A typing program;
- A short video clip.

3.2.2 Focus group interview: boys

The meeting with the boys proved to be less fruitful than the meeting with the girls. Only two of the boys, Vic and Tommy arrived for our scheduled meeting although I had also reminded all the boys, except Seppie whose cell phone number I did not have, of our meeting. Vic and Tommy were, however, very glad to see me and once again participated fully in the discussions that were to follow.

I was once again dismayed to find that the boys did not visit the Digital Doorway during the past week and were unable to provide me with their completed schedule. Vic was too involved in extra-mural activities and therefore was unable to practise at the Digital Doorway as depicted in the following quote:

Researcher:	*Alright. Now I want to ask you, did any of you go and practise at the computer this week?*
Vic:	*(shakes head in denial and rubs over hair once again) No.*
Researcher:	*Why didn't you practise?*

Vic:	*We were playing the match at school…*
Researcher:	*And..?*
Vic:	*And our coach, he said we must not be absent.*
Researcher:	*Right, so couldn't go?*
Vic:	*No.*
Researcher:	*You didn't have time to go?*
Vic:	*No.*
Researcher:	*And late in the afternoon or…?*
Vic:	*We practised until four o'clock.*
Researcher:	*So you didn't go after four o'clock?*
Vic:	*No.*

Tommy, on the other hand, did not have transport to get to the Digital Doorway to practise as he explained to me:

Tommy:	*Where I live far to the library…I live at Saulsville.*
Researcher:	*Okay. How do you get to the library or to school every day?*
Vic:	*(whispers to Tommy) Bus.*
Tommy:	*Mmmm…*
Researcher:	*Do you travel by bus?*
Tommy:	*Yea.*
Researcher:	*So you can't really get to the computer to come and practise always?*
Tommy:	*Yes.*

The two boys, however, remembered after a while that they had been to the Digital Doorway on one occasion to listen to music, but they were unable to listen to music as they once again experienced problems with the computer and thereby confirmed what the girls had earlier on told me, as indicated in the following quote:

Vic:	*This computers are not working!*
Researcher:	*Okay, what's wrong?*

Vic:	*When we are… (looks at Tommy), we tried to play music, he knows how to play music (points to Tommy).*
Researcher:	*Do you know, Tommy?*
Tommy:	*Yes.*
Researcher:	*Okay, fine…?*
Vic:	*It doesn't work.*
Researcher:	*Did he go and show you?*
Vic:	*It doesn't work!*
Tommy:	*It doesn't work!*
Researcher:	*Is it?*
Vic:	*All that computers.*
Researcher:	*What's wrong with them?*
Vic:	*Hey?*
Researcher:	*What's wrong with them?*
Vic:	*I think they are broken.*
Researcher:	*But what does it look like, tell me?*
Vic:	*That mouse is going, but when we click it doesn't…*
Researcher:	*It doesn't open...?*
Vic:	*Yes.*
Researcher:	*(nods her head)*
Vic:	*And others are….*
Tommy:	*Switched off.*
Researcher:	*Are they switched off? But then you come to the ladies in the library and you ask them if they will reset the computers for you.*

The boys were encouraged to once again visit the Digital Doorway as frequently as possible during the week. As with the girls they were given the assignment to find and explore the following two programs:

- A drawing program, as Vic had at one stage mentioned that he would like to use the computer to design and draw things;

- A short video clip.

I thanked the boys for their co-operation and participation in the research project thus far and gave each boy a Pez sweet dispenser. I was once again dismayed and astounded at the fact that these children did not have the slightest idea what this dispenser was. I explained and showed the boys how the dispenser worked and they were extremely excited about their toys.

3.2.3 Change in schedule

Due to a change in my personal schedule, I had to reschedule the next meeting with the target population, which was initially scheduled for Thursday 28 April 2005 at the community library, to Friday 29 April 2005 at the primary school they attend. I contacted the principal telephonically on Wednesday 20 April 2005 to obtain permission to interview the children at school the following week between 12:30 and 13:30. The children each received a letter to inform their parents about the change in schedule. See Appendix 8.

3.2.4 Summary of findings

During this focus group discussion, I once again became aware of the following problems which the children were experiencing:

- The computers were quite often not in a working order;
- When working, the children experienced other problems with the computer, for example the enter button that was not working and the fact that some of the computer programs had been deleted;
- They computer kiosk was quite often filled with other users who would not allow the children to work as they reserved themselves the right to work.

The children did not only experience problems with the computer itself, but had their own personal schedule, which included sports activities such as practising soccer and netball which kept them occupied during the afternoons.

I once again realised that all of the children did not stay that close to the Digital Doorway and therefore did not always have transport to practise at the computer kiosk.

3.2.5 Solutions to the problems

I promised the children that I would contact the CSIR and ask them to rectify the problems. The CSIR was contacted and I requested them to attend to the following problems:

- The effective functioning of the computers;
- Replacing the usernames and passwords that were removed from the terminals;
- Replacing the notice on the two terminals stating that children fifteen years and younger should receive preference to work on two terminals between 14:00 and 17:30;

- Fixing the "enter" button that was, according to the children, not working.

The CSIR promised to attend to the problems as soon as possible and I was therefore pleased to receive an e-mail from the CSIR on Friday 22 April 2005 to inform me that the problems had been attended to and that the Digital Doorway was once again operational. See Appendix 9 in this regard.

3.3 Third focus group interview

The third focus group interview was scheduled to be conducted in the staff room of the primary school the children attend. I arrived at school on Friday 29 April 2005 at 12:20. The principal was not at school and the deputy principal did not know anything about the arrangements I had telephonically made with the principal, but nevertheless gave me permission to interview the children. The deputy principal informed me that the staff and learners were busy preparing for a cross country event to be held in Centurion the following day.

3.3.1 Focus group interview: girls

The children were all brought to the staff room by their teacher and I decided to as usual, first conduct a focus group interview with the girls. All the girls were present at the focus group interview.

Sharon initiated the discussion by informing me that she and one of the other group members had had a very busy schedule during the week and that they were unable to practise at the Digital Doorway as I had requested them to do. She provided me with the following explanation:

Sharon:	*So on Monday we couldn't go there, me and Verona, I don't know about Zelina, because me and Verona we were practising there, because on Tuesday we were playing a match.*
Researcher:	*What match were you playing?*
Sharon:	*Hmm…netball. We came out at about four o' clock at school so we couldn't go there at all. On Tuesday we went to the match and came back at about six o'clock. On Wednesday…*
Researcher:	*Where did you go and play the match?*
Sharon:	*At Mleka…hmmm…Mleka Sports Complex or something like that.*
Researcher:	*Is it in Atteridgeville?*
Sharon:	*Yes, it is.*
Researcher:	*Okay. And?*

Sharon: *And then on Wednesday it wasn't school, we weren't here.*

Researcher: *Oh yes, did you celebrate Freedom Day?*

Sharon: *Yes*

Researcher: *And?*

Sharon: *Yes and then on Thursday, yesterday, we played a match…another match.*

Researcher: *Oh, okay?*

Sharon: *And then it's today!*

The girls did, however, remember that they had been to practise at the Digital Doorway once the previous week, but unfortunately once again experienced problems with the computer as explained in the following quote:

Researcher: *What did you do on Friday?*

Sharon: *Friday..hmm…we tried moving the things (shows the mousepad with her hands) and the mouse wasn't working.*

Researcher: *Was it still not working?*

Sharon: *Yes.*

Researcher: *Okay?*

Sharon: *And after that they switched them off, so we had to go...*

Researcher: *Who switched them off?*

Sharon: *They were blank, I don't know…*

Researcher: *Did you see somebody switch them off?*

Sharon: *No, it was blank, nothing was working.*

Zelina, as usual also experienced problems with regard to transport and was unable to get to the Digital Doorway to practise anything, but practised on their computer at home and explained that she had done the following:

Zelina: *No, I didn't have time to go there, because I have trouble with my transport.*

Researcher: *Trouble with your transport?*

Zelina:	*Yes.*
Researcher:	*Okay. So you never went?*
Zelina:	*Yes, but I am always busy with the computer at home.*
Researcher:	*Okay. Now what did you do on your computer at home?*
Zelina:	*Well, I…hmmm…I'm typing and playing games.*
Researcher:	*Okay, now what do you type on your computer?*
Zelina:	*A friend's letter.*
Researcher:	*Now in which program do you work when you type a letter? Which program do you use? On what do you work on the computer?*
Zelina:	*Microsoft Word.*

It was obvious that although she did not physically practise at the Digital Doorway, she did work on the computer at her house and she knew what she was doing on the computer.

The other group member, Nomsa, did go to the Digital Doorway, but was unable to do anything as she did not have anybody to show her what to do. She explained her predicament in the following way:

Researcher:	*Okay, Nomsa, tell me what did you do?*
Nomsa:	*Hmm...on Monday I went there and I was alone.*
Researcher:	*Was there nobody else there?*
Nomsa:	*I couldn't do nothing.*
Researcher:	*Why couldn't you do anything?*
Nomsa:	*(shrugs shoulders) Because if I'm alone I can't do anything, because Sharon, she's the one who help us.*

Nomsa visited the Digital Doorway twice during the week; it was therefore obvious that Nomsa was willing to go and eager to learn, but that she did not have enough confidence to explore the computer on her own. She was dependent on somebody to teach her how to use the computer. Her visits to the Digital Doorway were thus useless unless accompanied by somebody who could help and teach her how to use the computer.

After my discussion with the girls, I felt despondent as I really did encourage and motivate them on a weekly basis to visit the Digital Doorway as frequently as possible. I rewarded them weekly by bringing them something, which I thought would even further encourage and motivate them. At the end of our focus group interview, they handed me their completed weekly schedule (see Appendix 10 for completed weekly schedule for week 3) and I gave

each of them a Pez sweet dispenser as requested by them the previous week. I once again requested them to try and find a typing program during the week as well as a short video clip which they could watch. They promised me that they would visit the Digital Doorway during the course of the week as they explained:

Researcher:	*Okay. And now this week, what are you going to do this week then, because next week Friday is the last Friday I am going to see you and I will be coming to school again.*
Sharon:	*We will be able to go next week, because…*
Researcher:	*Will you be able to go next week?*
Sharon:	*We are playing a match the week after that.*

I reminded the girls that the coming week was the last time they had the chance to practise at the Digital Doorway, that they still had a chance of beating the boys in the competition and that they should try their best to visit the Digital Doorway as frequently as possible during the coming week.

3.3.2 Focus group interview: boys

I met the boys directly after my discussion with the girls and I was just as disappointed with the progress they had made during the past week. All the boys were present during the focus group discussion, which was the first time since I started conducting the focus group interviews with the children. I asked Sonny where he had been the previous week and once again I was informed that he was absent from school due to stomach ache as he explained:

Sonny:	*Last week I was sick, I didn't even go to school.*
Researcher:	*Is it? Now what was wrong with you?*
Sonny:	*Stomach ache.*
Researcher:	*Is it? Are you better now?*
Sonny:	*Yes.*

It was the first focus group interview that Seppie had ever attended and he could not give me an explanation as to why he had not attended the other two discussions. It therefore proved more convenient to interview the children at school during school hours as the possibility of interviewing and seeing everybody was so much better, but I do believe that it was not that convenient for the staff as they were losing valuable academic time.

Sonny was the only boy who had been to the Digital Doorway during the past week. The boys were also unable to explain why they had not been to the Digital Doorway and why they had not completed their weekly schedule as requested. It was obvious that they felt quite shy, ashamed and embarrassed by the fact that they had disappointed me as shown in Figure 20.

Figure 20: A very shy and ashamed Vic

The boys, who attended the last focus group interview, did however tell Sonny what they were supposed to look for during the week and he visited the Digital Doorway. He said that he firstly looked for a movie although the assignment given to the boys stated that they should look for a short video clip. He, however, looked for a movie on the DVD-Drive and did the following to access the drive:

Sonny:	*They told me that you gave them homework….*
Researcher:	*I gave them…*
Sonny:	*To find out…to find out how to play a movie.*
Researcher:	*Could you do anything?*
Sonny:	*I figured out a way of playing the movie, how to go there and how to get out of there.*
Researcher:	*Did you watch a movie?*
Sonny:	*No, I didn't (smiles).*
Researcher:	*Now did you find a movie there? How did you get to the movie?*
Sonny:	*I…I…I…went to the programs and I went to DVDs and I go into the DVD-Rom and then it said I must put in a CD...hmmm…the DVD.*
Researcher:	*Okay, but then it didn't have a DVD in it?*
Sonny:	*Yes.*

Sonny also looked for a drawing program as instructed by the others. It was, however, obvious to me that he knew Microsoft Paint, because he followed the menu to access Paint and did not use the paint program which the CSIR put on the desktop. He accessed the program in the following way:

Sonny: *Yes, it was on Monday. I only did that on Monday. Tuesday I went there and I went to draw…to draw some stuff.*

Researcher: *Did you draw?*

Sonny: *Yes.*

Researcher: *Did you find a program where you can draw?*

Sonny: *Yes.*

Researcher: *What's the program's name, do you know?*

Sonny: *Yes, accessories.*

Researcher: *Accessories? Did you go and draw there?*

Sonny: *Yes.*

Paint was nothing new to Sonny, it was something he knew. He therefore did not learn anything new in what he did on the Digital Doorway during the two days he worked there.

Sonny also experienced problems with the computer when he went to work on it as depicted in the following quote:

Researcher: *Did you have any problems when you went to work on the computer?*

Sonny: *(thinks) Yes, sometimes it jams, you can't move the mouse, it doesn't show anything.*

Researcher: *Okay, so you can't see the mouse pointer?*

Sonny: *Yes.*

Researcher: *Did you have other problems, or just that?*

Sonny: *(thinks) Err…no…it was just that.*

Researcher: *Was that the only problem?*

Sonny: *Yes.*

The boys were not aware of what I had previously asked the girls, so this was once again an indication to me that the Digital Doorway was not always functioning the way it should function. It was obvious that the boys experienced the same problems as the girls whenever they visited the Digital Doorway.

I was once again disappointed after my meeting with the boys as I really thought they would visit the Digital Doorway as frequently as possible during the past week to do the work which I expected them to complete for the week.

The boys were each given lip balm, as they requested the previous week. I also reminded them that I had kept my promise to bring them each lip balm, but that they had not done what I asked of them. I somehow wondered if this would have an impact on their performance for the coming week.

3.3.3 Change in schedule

At this stage, I realised that it was more convenient to see the children during school hours at school than after school as many of them found it difficult or even unable to attend the interviews conducted at the community library, due to their extra-mural activities or other problems such as transportation. I therefore obtained permission from the deputy principal to once again meet the children, for the last time, on Friday 6 May 2005 at the school between 12:30 and 13:30. All the children were given letters to give to their parents to inform them of the change in schedule. See Appendix 11.

3.3.4 Summary of findings

I was really disappointed that the children had not been to practise at the Digital Doorway during the course of the week, although I felt that we had at that stage built up such a good relationship that I really believed they would go out of their way for me. The kind of relationship is reflected in the following quote:

Sharon:	*I was thinking of getting you a Mother's day present. Is that okay?*
Researcher:	*Oh yes, you can if you want to!*
Sharon:	*(smiles) Okay!*
Researcher:	*That will be very nice, actually!*

During this focus group interview, I once again realised that the children seemed to be very involved in extra-mural activities at the school, which I regarded as an excellent way to keep the children off the streets in the afternoon. I was again confronted with the problems the children were experiencing at the Digital Doorway should they go and practise. The problem which was mostly mentioned during this focus group interview was the fact that the mouse did not seem to function properly.

After my discussion with the children, I went to the Digital Doorway to examine the terminals to determine whether the problems mentioned by the children really did exist. On investigation I found that only two of the terminals were working properly. The other two terminal's mouse touch pads did not seem to function properly. One of the mouse pointers did not even show on the computer screen and the other mouse was very slow to react to any movement.

Sonny was the only boy who really did try to work on the Digital Doorway during the week, but he did exactly what he had previously learnt, so no new learning had taken place. Nomsa was the only girl who had visited the Digital Doorway, but she was unable to do

anything as she had nobody with her to help and show her what to do. Learning for her would therefore only occur should somebody be there to teach her how to use the computer.

3.3.5 Solutions to problems

I decided to this time refrain from notifying the CSIR about the problems the children were experiencing at the Digital Doorway as I wanted to see if the problems continued, if they worsened or if the children were capable of finding their own solutions to the problems. I wanted to see whether the children would ask the staff at the community library to assist them whenever they experienced problems at the Digital Doorway and whether the staff at the community library would inspect the Digital Doorway on a daily basis as I requested them to do and whether they would take the initiative to contact the CSIR should the problems persist.

3.4 Fourth focus group interview

I contacted the principal on Thursday morning, 5 May 2005, to confirm that I would be seeing the children for the last time the next day and that I would like her permission to once again interview them at school between 12:30 and 13:30. The principal was once again reluctant to give me permission as she believed the children would lose too much academic time if I saw them for an hour. She eventually consented after I informed her that I would only see one group at a time and that the interviews would last for approximately half an hour each.

I went to Atteridgeville for the last time on Friday 6 May 2005 to explore whether my target population had learnt anything new during the week and then furthermore to explore how they had acquired the newly learnt skills.

3.4.1 Focus group interview: girls

I met all of the girls at school on Friday 6 May 2005 at 12:30. It was obvious that the girls had really tried their utmost best to access the computer and visit the Digital Doorway as frequently as possible during the past week as indicated on the schedule they handed to me at the onset of our focus group discussion. See Appendix 12 for their completed schedule for week 4. Sharon, as usual, took the lead in the focus group interview. She reported that their efforts to access the computer at the Digital Doorway, proved to be somewhat fruitless as they were once again hindered from accessing the computer, mostly because the computer was not in a working condition as she explained in the following quote:

Researcher:	*Tell me, what did you do this week?*
Sharon:	*This week, hmm, on Friday the enter button was not working on all the computers.*
Researcher:	*On all the computers?*
Sharon:	*Yes, so we couldn't do nothing.*
Researcher:	*Okay?*

Sharon: *On Sunday, they were all jammed (Verona speaking with Sharon)*

Researcher: *What do you mean by jammed, if it is jammed?*

Sharon: *Hmmm.. the mouse is…*

Verona: *Not working.*

Sharon: *it's like, we tried moving it two times then the third time it doesn't work.*

The problems the girls were experiencing did not, however, hinder them from returning to the Digital Doorway to try and access the computer during the days to come. They once again tried unsuccessfully to solve the problem by requesting help from the librarians as they reported:

Researcher: *Then on Tuesday the computers were not working, they were switched off.*

Sharon: *Okay, hang on, how do you know they were switched off?*

Researcher: *Because it was blank, nothing was showing.*

Sharon: *But did you move the mouse?*

Researcher: *Yes we did and the ladies in the library told us that they tried switching them on, but they couldn't cause I don't know something was wrong there.*

It seems as though the computers were working at some stage during the week, but then again the girls' efforts in trying to access the Digital Doorway were in vain, as they were hindered by other factors as Sharon explained:

Sharon: *And then on Thursday we all got there, but it was full, we could not know what was happening (reads from schedule).*

Researcher: *Was it full on Thursday?*

Sharon: *Yes it was.*

Researcher: *Who was there on Thursday (Verona and Nomsa put up their hands)? I mean the people, were there people working there?*

Sharon: *Yes, people over fifteen, a lot of people, because it's like you..there is a train station right?*

Researcher: *Yes?*

Sharon: *And they come from the train station so they see the computer and they come and they try working on it, yes.*

Nomsa did visit the Digital Doorway accompanied by another friend, but she too was unable to do anything as she was firstly a bit scared to approach the person working at the Digital Doorway and secondly proved not capable of doing anything as she explains:

Nomsa: *On Monday I go to the computer alone and there was one big boy…*

Researcher: *Okay, yes?*

Nomsa: *He was alone.*

Researcher: *Okay?*

Nomsa: *So I was with my friend…*

Researcher: *Yes?*

Nomsa: *I was scared to talk with him*

Researcher: *So you were scared to speak to the boy?*

Nomsa: *Yes.*

Researcher: *Okay?*

Nomsa: *So I asked him, could he help me go to the typing program.*

Researcher: *Okay and then?*

Nomsa: *And then he said he couldn't. He said press this button and this one and this one, but I could not do it.*

Researcher: *So you couldn't do it?*

It was obvious that the girls were once again deterred from accessing the Digital Doorway mostly because of the fact that the computer was not functioning as it should.

Zelina initially could not go because extra-mural activities kept her busy and then eventually when she requested her mother to take her to the Digital Doorway, she refused as she felt that she need not practise at the Digital Doorway if they had a computer of their own at home as depicted in the following quote:

Researcher: *Okay. And Zelina, what did you do?*

Zelina: *I did not have time to go to the library. On Wednesday I had to run.*

Researcher: *Do you do cross country, or what type of running do you do?*

Zelina: *Cross country.*

Researcher: *Fine and then the other days, what did you do the other days?*

Zelina: *I didn't have time to go. When I told my mother that she must take me to the library with her own car, she doesn't want to. She said I must practise at home.*

Researcher: *Okay. So she said you can't go and practise there and that you must practise at home.*

Zelina: *Yes.*

It was once again clear that no apparent learning had taken place during the week although the girls did visit the Digital Doorway as frequently as possible.

At the end of the focus group discussion, I handed each girl a certificate of participation, as depicted in Appendix 13. I also gave each R20,00 as I believed that the girls were the winners of the competition. They had from day one, been very committed to the research project, always handed in their completed schedules at the end of every week and always reported back on what they had achieved or not achieved during the week.

3.4.2 Focus group interview: boys

I met all of the boys at 12:50 in the staff room of their school. It was clear to me that the boys had really tried to do everything I requested them the previous week. They provided me with their completed schedule, as depicted in Appendix 14, which indicated how often they had been to the Digital Doorway as well as that which they were capable of doing.

Sonny took the lead during the focus group discussion and reported that they initially experienced fewer problems than the girls at the Digital Doorway as depicted in the following quote:

Vic: *Last week Friday we go there at half past three and we were out at four o' clock.*

Researcher: *Okay?*

Sonny: *And problems, there were no problems.*

Access to the Digital Doorway was, however, not always possible as the boys soon experienced problems, but like the girls they were committed and felt responsible for their learning and tried to solve the problems as explained in the following quote:

Sonny: *And Saturday we didn't go, they were switched off.*

Researcher: *Were they off?*

Sonny: *Yes.*

Researcher: *How do you know they were switched off? Just tell me?*

Sonny: *Cause we tried, we asked the security and nothing showed on the screen.*

Researcher: *Did you move the mouse just to look?*

Sonny: *Yes we did.*

Researcher: *And was there nothing?*

Sonny: *Nothing.*

Not only were the computers switched off according to the boys, but when they eventually were able to access the computers, they too experienced the following problems with the mouse:

Researcher *Then on Monday?*

Sonny: *Monday, yes we got there at three o'clock and we were out at half past three.*

Researcher: *Yes?*

Sonny: *Er..Monday the mouse doesn't have a point.*

Researcher: *So it didn't show on the screen?*

Sonny: *Yes.*

Researcher: *All of the computers?*

Sonny: *Yes, all of the computers didn't show the points.*

Researcher: *Okay, so the mouse pointer didn't show on the screen?*

Sonny *Yes.*

The problems the boys experienced did not deter them from returning to the Digital Doorway time and again to pursue their learning. The computers were not only switched off, but the mouse was not working either; the computers were also "jammed" at times as they reported:

Researcher *On Thursday, did you go yesterday?*

Sonny: *Yes (all the boys nod their heads) on Thursday we were here.*

Vic:	*It was jammed.*
Researcher:	*Was it jammed? Now why do you say it was jammed? What do you mean when you say it is jammed?*
Sonny:	*When it is jammed, the mouse was working, but we try to click and it doesn't do anything.*
Researcher:	*Okay. Yes, but was the mouse pointer showing on the screen?*
Sonny, Vic and Seppie:	*Yes.*
Researcher:	*Okay. But if you click it doesn't open anything?*
Sonny, Vic and Seppie:	*It doesn't do anything.*

At times the Digital Doorway was functioning properly and the boys were capable of accessing the computer and learning. Sonny mostly took the initiative to teach the boys how to draw, how to enter programs and how to type information as depicted in the following quote:

Researcher:	*And you said you drew?*
Sonny:	*Yes.*
Researcher:	*Now Sonny, I know you know how to draw. Did you show them how to draw?*
Sonny:	*Yes, I showed them how to draw and go there.*

Although Sonny showed the boys how to draw, the rest of the group did not practise the skill. When I asked Seppie if he would be able to access the drawing program and draw by himself, he replied that he would not be able to as depicted in the following quote:

Researcher:	*Seppie, will you be able to draw if you had to go there alone now?*
Seppie:	*No (shakes head in denial).*

Sonny also showed the boys how to access a program where they could type and change the font, but here too I doubt whether the boys would be capable of doing it themselves, but they were confident that they would try as shown in the following quote:

Researcher:	*And the program that Sonny showed you that he can work, that he can type on, will any of you be able to go in it if Sonny isn't there? Will you be able to, Vic?*

Vic:	*I'll try.*
Researcher:	*You'll try. And you, Seppie, will you be able to do it if Sonny wasn't there to show you?*
Seppie:	*Yes, I'll try and do it.*
Researcher:	*You'll try?*
Seppie:	*Yes.*

What the boys really enjoyed, it seemed, was that they were capable of playing games. Vic taught the other boys how to play cards and Vic and Sonny taught Seppie how to play pinball, which he really seemed to enjoy and believe he would be capable of doing himself if he had to visit the Digital Doorway in future as depicted in the following quote:

Researcher	*And you, Seppie?*
Seppie:	*Sonny teached me to play games.*
Researcher:	*Which games did you play?*
Seppie:	*Pinball.*
Researcher:	*Do you like that?*
Seppie:	*Yes.*
Researcher:	*Will you be able to play that on the computer by yourself?*
Seppie:	*Yes.*

It was obvious that the boys had achieved more that the girls during the past week, but although they had been taught quite a few new things by Sonny, I was not sure whether they would be capable of doing much, except accessing the games, should they be requested to do so.

I thanked the boys for their participation during the research project and handed every boy a certificate of participation, as depicted in Appendix 15. I also gave each R10,00 as I felt they really gave me their co-operation and were so involved during the project that it would not be fair if I did not somehow acknowledge this.

3.4.3 Summary of findings

I once again realised during the focus group interview conducted with these children that in spite of a very busy schedule, they were really co-operating well and tried their best to visit the Digital Doorway as frequently as possible.

I was again convinced that the Digital Doorway was not functioning as it should as both groups of children mentioned numerous problems which they had encountered during the week. It was also pleasing to note that the children accepted responsibility for their own

learning by requesting help from various people whom they felt were capable of helping them.

This was the first time that I felt the boys had really tried to learn something at the Digital Doorway and that they were at times successful in acquiring new skills. I doubt whether any of them will, however, remember how to change the font when typing a letter and whether they will in any case remember which program Sonny accessed and used as a word processor. I do believe that they will be able to play games as this was something which they really enjoyed.

I was disappointed that the girls did not achieve much during the week, but I do realise that it was not due to the fact that they did not visit the Digital Doorway frequently during the past week, but rather because of problems experienced when trying to gain access to the computer, which was not their fault.

After conducting the focus group interview with the children, I paid a visit to the Digital Doorway to gain information with regard to the functioning of the computer. When I arrived at the Digital Doorway, I met four young men who were trying to access the computer. Two of the terminals required of the men to enter a username and password, these were however unknown to the young men. Somebody had in the meantime written the usernames on each computer with a red permanent marker. The men at the Digital Doorway did not realise that this was the username required to access the computer, nor did they know that the passwords were the same as the usernames. I showed them how to gain access by entering the usernames and passwords for them, but realised that anybody trying to gain access after them, will experience the same problem as these young men.

Further investigation revealed that the other two terminals were not functioning at all. One of the computers had an open window showing numerous programs, but I found it impossible to access any of these programs. The other terminal only displayed the Digital Doorway desktop, the mouse did not work and no programs were available or could be accessed.

I was dismayed to find that my experience of the Digital Doorway was exactly the same as that of the children.

4. Overview

During a conversation with the principal of the school, I asked her what criteria they used to select the prefects, who were all part of the target population, at their school. She mentioned to me that she and the rest of the staff felt responsibility, punctuality, commitment and neatness were important criteria to consider when selecting prefects. During the numerous focus group interviews conducted with the target population, I realised that these children were really committed to the research project and that they accepted responsibility for their learning.

Although the girls did not always physically practise at the Digital Doorway, quite a lot of individual learning took place as the individual members accepted responsibility for their learning and deemed it necessary to practise and explore computers to their disposal using resources available to them as depicted in the following quote:

Researcher:	*What did you learn during this month, Zelina?*
Zelina:	*Yes, I learnt something. How to use Microsoft Word.*
Researcher:	*But that you learnt at home you didn't learn it here?*
Zelina:	*Yes.*
Researcher:	*Good. Who taught you how to use Microsoft Word?*
Zelina:	*My sister (shows bigger sister with hands).*
Researcher:	*Your bigger sister?*
Zelina:	*Yes.*
Researcher:	*So you knew you had to learn something and she taught you that?*
Zelina:	*Yes.*

Sharon approached her mother and requested her to teach her new things on the computer and this was really pleasing to me as I realised that although the girls could not always access the computer at the Digital Doorway, they were eager to learn and to show me that they were capable of achieving something during this time. The following quote indicates what Sharon had learnt during this period:

Sharon:	*I learnt how to like download music from some other computer to other or to e-mail.*
Researcher:	*Who taught you that?*
Sharon:	*My mother.*
Researcher:	*So you asked her you want to learn some more things on the computer?*
Sharon:	*Yes.*
Researcher:	*Because you were involved in this project?*
Sharon:	*Yes.*
Researcher:	*Good. Did she show you how to download music?*
Sharon:	*Yes, she did, but I don't that, I am still learning.*
Researcher:	*So you're not that good at it?*
Sharon:	*Yes.*
Researcher:	*And did she show you how to send e-mail?*

Sharon:	*Yes, I've seen her, but I don't know that much, because I see her every time I go with her to work, she e-mails something to another person.*
Researcher:	*Okay, so you can't do it yourself yet, but you know about it.*
Sharon:	*Yes. And I know how to start typing a business plan, start it and finish it, from there I know how to print it.*

I met the target population on a weekly basis for a period of a month. During this period, I built up a good relationship with the children and even Tommy who was initially emotionless started warming up towards me. These meetings were scheduled to determine what progress the children made on a weekly basis with regard to the use of the Digital Doorway, to ensure involvement in the project, both from my side, as well as the children's side, to maintain interest, to motivate and to encourage them.

During this period I tried to answer the two critical questions, namely:

- To what extent have children obtained computer skills through the launching of the Digital Doorway project in Atteridgeville?
- How did these children obtain computer skills without the guidance of a facilitator during the course of the Digital Doorway project in Atteridgeville?

I was initially discouraged by the fact that no apparent learning was taking place, but in the process I became aware of so many other problems that were hampering the process of learning. These problems are mainly assigned to personal problems as well as the mechanical failure of the Digital Doorway.

A full synthesis of the findings will be provided in Chapter 5.

Chapter 5: Conclusion

1. Introduction

Chapter 5 concludes this mini-dissertation with a synthesis of the findings.

In the context of Dr Mitra's theory of Minimally Invasive Education, which was described in Chapter 2, and the deployment of the Digital Doorway project in Atteridgeville (which was discussed in detail in Chapter 1) the premise of this research study was to determine how successfully the participating children have obtained computer skills (without the guidance of a facilitator) in an environment where adaquate computer facilities were provided.

The following two critical questions were posed:

- First critical question

To what extent have children obtained computer skills through the launching of the Digital Doorway project in Atteridgeville?

- Second critical question

How did these children obtain computer skills without the guidance of a facilitator during the course of the Digital Doorway project in Atteridgeville?

Before it was attempted to respond to these questions, a literature study was undertaken which dealt with the aspects of Information and Communication Technologies and education relevant to this particular kind of research. Chapter 2 explored the current literature relating to these topics.

The research design and methodology adopted in this study were described in Chapter 3. Data was gathered by means of individual and focus group interviews. The data gathered during the individual and focus group interviews were recorded in Chapter 4.

In this chapter it is proposed to present:

- A summary of the research findings pertaining to the two critical questions;
- The conclusions derived from the research findings;
- The recommendations.

2. Summary of research findings

The following research findings are based on the data obtained through the semi-structured and focus group interviews conducted with the participants pertaining to the first and second critical questions. It was decided to address the two questions simultaneously during the interview sessions due to the interdependency between the two questions.

I initially endeavoured to explore to what extent and how children could obtain computer skills without the guidance of a facilitator within the context of the Digital Doorway in Atteridgeville. This method of learning without the guidance of a facilitator is referred to by the CSIR as Minimally Invasive Education, a concept derived from Dr Mitra's "Hole-in-the-Wall" experiment conducted in India. Minimally Invasive Education (MIE), as stated in Chapter 2, is defined by Dr Mitra as:

> *A pedagogic method that uses the learning environment to generate an adequate level of motivation to induce learning in groups of children, with minimal, or no, intervention by a teacher (Mitra, 2003).*

This method is based on a fundamental shift away from a teacher-centred approach to a learner-centred approach in education. In his definition of MIE, Dr Mitra speaks about "…learning in groups of children".

In the "Hole-in-the-Wall" experiment conducted by Mitra in India, it was found that children taught each other after discovering different operations and formed impromptu classes where they taught one another.

The CSIR follows an extreme constructivist approach regarding their Digital Doorway installations throughout South Africa. The Digital Doorway projects encourage a learner-centred and hands-on approach, it requires of learners to be actively involved in the learning process and to work together collaboratively.

Constructivism forms the foundation of the current educational policy, Outcomes Based Education (OBE) implemented by the South African authorities. According to Green and Gretler (2002), constructivism, however, has only recently been used in efforts to reform schools although only limited research has been conducted in this field.

The Department of Education (2003, p. 13), identified ICT as one of the most powerful tools of supporting learners to achieve the nationally-stated curriculum goals as it encourages:

- A learner-centred approach;
- Active, inquiry-based and hands-on learning;
- Collaboration amongst learners and facilitators; and
- Critical thinking, creativity, informed decision-making and analytical skills.

One of the aims of the Digital Doorway projects deployed by the CSIR was to:

> *Provide people in rural and disadvantaged areas with computer equipment and allow them to experiment and learn without formal training and minimal external input (Smith et al., n.d.).*

Based on the CSIR's decision to install their computer equipment in rural and disadvantaged areas, I entered the field with the presumption that the participants had never or hardly ever used a computer before and would therefore have very little or no knowledge of a computer.

The principal of the primary school closest to the Digital Doorway installation was contacted after the Digital Doorway equipment had been installed in Atteridgeville on 6 April 2005. The school was requested to send their prefects to the community library so I could introduce them to the Digital Doorway installation. These eight learners, aged between 12 and 13 years of age, became the target population. After obtaining consent from the principal to interview the target population, I conducted the first individual semi-structured interviews with the participants on 7 April 2005. Weekly focus group interviews were scheduled with the children for a period of a month starting on 14 April 2005 up and until 6 May 2005.

I soon realised that the specific area where the computer equipment of the Digital Doorway was installed in Atteridgeville, was one of the more affluent areas of Atteridgeville and it is doubtful whether it can be regarded as a disadvantaged area. The Digital Doorway was installed adjacent to a fully equipped community library where the community were capable of accessing the Internet at the library and using a word processing package at a minimal fee of R5,00 for 15 minutes. During a discussion with the principal of the primary school the participants attend, she confirmed that the specific area was one of the more affluent areas in Atteridgeville.

I deemed it necessary to determine the participants' computer skills level at the onset of the research project to establish a baseline against which further skills obtained during the research project could be measured. Individual semi-structured interviews were therefore conducted with all of the participants as discussed in detail in Chapters 3 and 4. During the individual semi-structured interviews conducted, it was established that all of them had used computers before and that half of them had computers to their disposal at home and therefore already possessed certain basic computer skills. Most of them used computers to play games, but some even accessed and used the Internet as expressed in the following quote:

Sharon:	*Yes, while my mother was planning for the wedding, I liked going through the Internet, seeing what kind of dress my mother likes, showing her the dresses and..*
Researcher:	*Where do you go onto the Internet?*
Sharon:	*Hmmm…I look at the Internet at my mother's house and my father's house.*
Researcher:	*Do they both have Internet?*
Sharon:	*Yes.*

To ensure that the participants stay motivated and focused throughout the research project and to monitor the progress made by the groups in obtaining additional computer skills, I conducted weekly focus group interviews with the girls' and the boys' groups during the full duration of the project, as discussed in detail in Chapter 4. The individual interviews as well as focus group interviews were video taped and recorded by means of an electronic Dictaphone (short video clips of the interviews can be viewed on the compact disc provided at the back of this mini-dissertation). I also made field notes directly after the interviews to

encapsulate the findings obtained during the specific interview. The data obtained from the video recordings and tape recordings were transcribed and then coded and categorised (the transcriptions can be viewed on the compact disc provided). The leaders of the groups (discussed in Chapter 3 and 4) were also requested to complete a weekly schedule of their visits to the Digital Doorway installation. They had to record what they managed to master, as well as any problems they had experienced during their visits. The interviews conducted with the participants provided me with sufficient data to determine what computer skills they had obtained and how they had obtained these computer skills.

3. Conclusions derived from research findings

During the early fieldwork stage of the research project, it soon became evident to me that I would not be able to answer the critical questions set as the data that emerged from the interviews and discussions conducted with the children, indicated that there were numerous problems which prevented the children from working on the computers and thus they were not getting the opportunity to obtain or improve their computer skills during the Digital Doorway project in Atteridgeville.

3.1 Lack of real access

Various factors inhibited the learners to gain real access to the computer facilities at the Digital Doorway. Real access, as defined in Chapter 2, refers to access that:

> *…goes beyond just physical access and makes it possible for people to use technology effectively to improve their lives (Bridges.org, 2001).*

The concept of real access was described in the literature study as the *acquisition* and *utilisation* of computer hardware and software to obtain relevant material on-line. It was also pointed out that between the acquisition and the utilisation of computer hardware and software certain critical factors such as availability and accessibility have to be addressed to make real access successful.

Bridges.org (2001) in relating the theory to the Digital Doorway project states, that the acquisition point relates to the physical installation of the computer equipment at the community centre and successful utilisation would therefore be dependent on the availability and accessibility of the equipment and software. The literature study highlights the fact that there are actually twelve critical elements that have to be addressed before real access is accomplished.

The following critical elements or factors were found to be lacking at the Digital Doorway installation in Atteridgeville:

- Physical access;
- Appropriate technology;
- Capacity;

- Relevant content;
- Certain social-cultural factors;
- Trust;
- Sustainability.

More than half of required twelve critical elements were therefore lacking at the Digital Doorway installation in Atteridgeville, which meant that real access could not be accomplished. The extent of the impact of these lacking elements can clearly be seen in Figure 21.

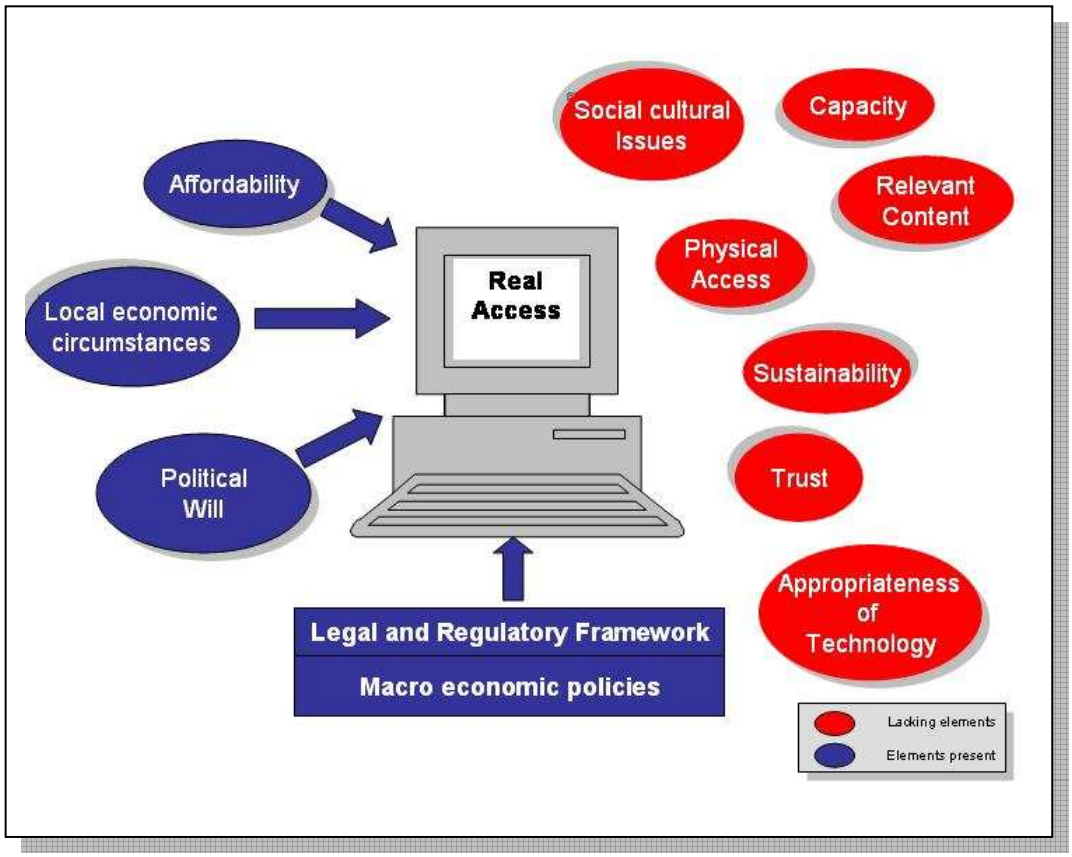

Figure 21: Lacking elements at Digital Doorway installation in Atteridgeville

The lacking elements depicted in red in Figure 21 will be discussed in detail in the rest of this chapter.

3.1.1 Lack of physical access

Warschauer (2002) correctly points out that the mere installation of computers in a community does not ensure that the community will be able to bridge the digital divide and providing people with computers does not necessarily include meaningful access to ICT. The Department of Education (2003) in this respect maintains that:

> *Deployment of ICTs does not guarantee their efficient utilisation. Capacity building and effective support mechanisms must accompany deployment. (p. 3)*

During the various focus group interviews conducted with the children, it became evident that the Digital Doorway was not functioning as anticipated. The children time and again complained that they were unable to access the computer due to various mechanical failures. The children reported on a weekly basis that the computers were either "jammed" or blank, that the mouse wasn't working and that the username tags and passwords had firstly been rotated between the computers and then eventually removed from the terminals. The notices stating that two terminals were reserved daily for the use by children younger than fifteen between 14:00 and 17:30 were also removed. On investigation I found that this was quite true.

It was obvious that nobody was really overseeing the maintenance of the computer equipment at Atteridgeville's Digital Doorway site and that the CSIR was therefore unaware of the fact that the computer equipment was mostly not working properly. The librarians had a key to reset the computer, but there was no hard or fast rule as to how often they should inspect the equipment or when they should evaluate problems or contact the CSIR. The community were also uninformed as to what is expected of them to do should they experience any problems as no notice with any contact numbers were placed at the Digital Doorway site in Atteridgeville. There was therefore no mention of "effective support mechanisms" that the Department of Education (2003, p. 3) describes as pre-requisite to ensure the availability and sustainability of computer access.

Not only did the children battle to gain access to the computer, they also experienced problems with transport getting to the Digital Doorway site. Bridges.org (2001) points out that physical accessibility includes problems that users experience in physically getting to a computer installation.

The Digital Doorway installation in Atteridgeville was placed adjacent to the community library in Ward 68 and therefore physically accessible to numerous people. The Ward, in which the Digital Doorway installation was placed, was however, not the biggest Ward in Atteridgeville (See Appendix 16 for a detailed analysis of the population of Atteridgeville). The vast majority of people living outside Ward 68 therefore needed some sort of transport to get from their homes to the Digital Doorway site. In this respect Bridges.org (2001) claims that:

> *It is increasingly clear that for a country to put ICT to effective use, it must be "e-ready" in terms of infrastructure, the accessibility of ICT to the population at large…*

Herselman and Britton (2002) pointed out in their study conducted in Port Elizabeth and surrounding areas that it was a distressing situation that learners in developing areas have to travel great distances to get to ICT access points aggravated by a lack of a proper transport infrastructure.

3.1.2 Inappropriateness of technology

The appropriateness of technology is described by Bridges.org (2001) as the aspect that addresses the "suitability" of technology for the specific circumstances. During the focus group interviews conducted with the participants, two of the participants (Sharon and Verona) mentioned that they would have used the computer more if they would have been able to access the Internet on the computer as seen in the following quote:

Sharon:	*I think it is important that it didn't have an Internet and something like that, because most of us, sometimes when you go to the computers we see the, hmmm… website thingy from Wildroom we want to go there and see the this and this.*
Researcher:	*On this computer?*
Sharon:	*No, from the TV and when we are home.*
Researcher:	*So do you think you would have used that computer more if it had Internet?*
Sharon:	*Yes.*
Researcher:	*So you wanted Internet? But what do you want to do on the Internet?*
Sharon:	*I want to search for things, look just like Wildroom, there is interesting things…*
Researcher:	*What is Wildroom?*
Sharon:	*It's a kiddie's program, it has presenters, sometimes celebrities come, they have guests…The fun game they do everyday from half past three till four o'clock.*
Researcher:	*Okay, so you will like to go on their website?*

It was obvious that Sharon knew that she could use the Internet to search for websites that were of interest to her. The question can therefore be posed why then was there no Internet connectivity allowed at the Atteridgeville site if even learners in the primary schools knew that they could use the Internet to search for something which was of particular interest to them?

3.1.3 Inadequate capacity

This element of capacity was explained in Chapter 2 as the ability of users to understand and to use technology for the purposes intended. During the individual interviews conducted with the participants as well as the focus group interviews, it was soon evident that most of these children had no or very little knowledge of a computer's capabilities. Two of the children knew that you could use the computer to send messages, but the following answer received from Sonny is most probably representative of the group as a whole:

Researcher:	*Do you know what a computer is capable of doing? What can you do with a computer?*
Sonny:	*Hmm, I don't know, because I don't know much about the computer, hmmm…I don't know what is in the computer.*

It seemed as though the children did not really have a great desire to learn how to use the computer as they had no idea how they could benefit from its utilisation. This is in line with the findings of Bridges.org (2001) who claims that:

> *…people are unable to effectively use ICT because they do not know how to use it or they do not understand how it can be relevant to their lives.*

3.1.4 Irrelevant content

Relevant content was referred to in Chapter 2, as the issue that information being accessed must be relevant with regard to content, language and other related issues.

Warschauer (2002) claims that:

> *Content and language, literacy and education, and community and institutional structure must all be taken into account if meaningful access to new technologies is to be provided.*

At a certain stage two of the participants (Verona and Sharon) accessed a geometry program on the computer at the Digital Doorway site. During my focus group interview with the participants I became aware of the fact that these girls did not really enjoy using the geometry program. They claimed that it provided no challenge to them. They were the only two capable of doing geometry in their group as they had already done geometry in grade 7 while the other grade 6 learners had never done geometry before. During the interview the girls claimed that they preferred a traditional classroom where their teacher taught them mathematics to the geometry program on the Digital Doorway.

The participants never went back to access the geometry program again. It was therefore clear that some of the programs installed on the Digital Doorway did not seem to be relevant to primary school learners. Surely, the installation should cater for all the age groups and appropriate software should have been loaded for all the potential users. Bridges.org (2001), in line with Warschauer (2002), claim that information accessed must be relevant.

Literature relating to numerous topics was also installed on the computer by the CSIR for the community to access, but the computer was installed adjacent to a well-equipped community library, which was visited on a regular basis by the community. The question can then be posed as why would the community search for literature on the computer if they could access everything at the library while being assisted by the librarians?

3.1.5 Social-cultural limiting factors

Another problem experienced by the children, was that the older children would not allow them to work on the computers even though the CSIR had put up a notice that two of the terminals were reserved for children younger than fifteen between 14:00 and 17:30. The girls claimed that the older boys "bullied" them and would not believe them when they claimed they had to practise at the Digital Doorway installation. Bridges.org (2001) points out that social-cultural factors as in the case where people are limited or discouraged from using technology because of their race, gender or other social-cultural issues are one of the key inhibiting factors that prevent people from gaining access to ICTs.

Another major reason, which can also be categorised under social-cultural factors, was the fact that the children were intensively involved in extra-mural activities. The girls mainly practised netball, played weekly netball matches and ran cross country, while the boys practised soccer and played soccer matches. The coaches of the various netball and soccer teams felt it was important for the participants to attend practices as described in detail in Chapter 4. The children therefore had very little other time available to visit the Digital Doorway.

Another social-cultural factor that limited frequent visits to the Digital Doorway, was the fact that the participants did their homework in the afternoons and sometimes even had to attend school over weekends to complete, for example their portfolios or to participate in sport.

A limiting social-cultural factor mentioned by Sonny that prevented him from visiting the Digital Doorway, was the fact that he was quite often absent.

3.1.6 Lack of trust

Trust according to Bridges.org (2001) simply means whether the users of the particular technology have confidence in the technology they use.

During my various focus group discussions with the children, it became clear that they had no confidence in the technology they used. The participants claimed that they could understand if a computer was sent away for repairs and it was therefore not working, but they could not understand that a computer, that is supposed to be in a working condition, does not work. The following quote explains it all:

Sharon:	*I think we are not used to it, because at home when we switch on the computer it works, not like those here you have to wait, go to the library to have it switched on.*
Researcher:	*You say the big problem was because the computers weren't working?*
Sharon:	*Yes.*
Researcher:	*You are used to, whenever you work on a computer, you go and sit down and switch it on…*

Sharon: *Yes, unless they fixing it and it is not at home, I understand, but when like it is not working, it's right there for us to use it, but it doesn't work.*

It was obvious that the children were disappointed with the Digital Doorway installation at Atteridgeville where they always seemed to experience problems with the proper functioning thereof as Verona explains:

Verona: *Because all the time we go to the computers are jammed and other times they are blank and other times there are many people there and then we can't work*

Researcher: *Okay, so you say you didn't learn anything because the computers were blank, it was jammed and there were too many people there?*

Verona: *(nods head in agreement)*

My own experience of the Digital Doorway on the many visits I paid to the site was exactly the same as that of the target population. The librarians at Saulsville community library confirmed time and again what the children were saying about the computer and they were unable to rectify the problems at the Digital Doorway. They were only capable of resetting the computer and that did not seem to solve the problems they and the children were experiencing. It is therefore clear the target population as well as the community had no trust in the Digital Doorway installed in Atteridgeville.

3.1.7 Lack of sustainability

Two of the main elements of concern mentioned by the Department of Education (2003, p. 3) that can determine ICT's future as a tool for economic and social development, is sustainability and efficient utilisation. The Digital Doorway is an excellent example of an upmarket computer, placed in a developing area that was not sustained or maintained resulting in half the terminals not being in a working condition most of the time. The computers could therefore not be accessed and utilised effectively. Every time I visited the Digital Doorway installation there were only two to four people there as most of the terminals were not functioning properly. Bridges.org (2001) correctly asserts in this regard that:

> *…sustainable solutions must provide more than computers and connections.*

If the community, however, had been given ownership of the computer and were capable of deciding on the installation of software, responsible for maintenance, etcetera, the Digital Doorway installation might have proved to be more successful. Cecchini and Scott (2003) in this respect claim that:

> *Successful ICT projects are characterized by local ownership and the participation of the community. (p. 83)*

Cecchnini and Scott (2003, p. 1) believe that providing a community with low-cost access to computers might be a prerequisite for the successful implementation of ICT, but it is not the only determining factor for successful implementation as was eventually seen with the installation at Atteridgeville where real access was not provided to the community. Some of the key factors identified by Cecchini and Scott (2003, p. 1) for the successful implementation of ICT, is the involvement of the community and members of the community who could act as intermediaries as this will lead to local ownership and the provision of content and services that answer the needs of the community.

3.2 Digital Divide

During my first meeting with the target population, I became aware of the fact that there was a digital divide within the group. It became apparent that some of these children had either computers at home, or were exposed to the usage of computers elsewhere. According to the literature the digital divide does not only exist between developed and a developing country in the world, but it also exists between those who have access to technology and those who do not have access within the borders of a country. This digital divide is commonly referred to as the "haves" and the "have-nots" (Bridges.org, 2001) – which was exactly what I had experienced at the Digital Doorway in Atteridgeville.

The participants visited the Digital Doorway installation on a regular basis in their groups as they were requested to explore the computer as a group. During the interviews conducted with the participants, I found that they indeed visited the Digital Doorway installation as frequently as possible as they were committed to the research project, accepted responsibility for their learning, completed a weekly schedule of their activities at the Digital Doorway and also knew that I was monitoring their progress on a weekly basis.

3.3 Collaborative learning

During the weekly focus group interviews conducted with the participants I soon realised that both groups had identified two children, Sharon and Sonny, who knew the most about computers, to act as their facilitators. Sharon and Sonny both had computers at home and were therefore part of the "haves" group whereas most of the other participants were part of the "have-nots" group (Bridges.org, 2001).

Whenever the Digital Doorway installation was in a working condition, Sharon and Sonny, acted as facilitators for the rest of their respective groups and I found that collaborative learning occurred amongst the participants. It was clear that there was now not only a division in the group with regard to the "haves" and the "have-nots", but that Sharon and Sonny had now become the "knows" opposed to the "know-nots" in line with what Mitra (2003) found during the "Hole-in-the-Wall" experiment.

Whenever the Digital Doorway was functioning properly, the different groups practised at the Digital Doorway and collaborative learning occurred. Alessi and Trollip (2001) define collaborative learning as:

> *…environments in which learners work on a shared project or goal. (p. 34)*

In the case of the Digital Doorway, the goal of the project was for the participants to explore, use and learn how to use the computer as a group.

During the various focus group interviews conducted with the children, I realised that Sharon and Sonny only showed the rest of the group what they were capable of doing on the computer. The rest of the participants never or hardly ever had time to practise what they were shown. When asked whether they would be able to access and work on the different programs, for example Paint, were they alone, they usually provided me with the following:

Researcher:	*Why couldn't you do anything?*
Nomsa:	*(shrugs shoulders) Because if I'm alone I can't do anything, because Sharon, she's the one who help us.*
Researcher:	*Okay, so she wasn't there to help you?*
Nomsa:	*(nods head in agreement).*

In hindsight, I believe the participants would have obtained more computer skills, given the computers were functioning as they should have, should the children have been taught how to use the computer by their facilitators or a knowledgeable peer and allowed to practise and repeat what was taught, thereby following a more behaviouristic and teacher-centred approach in the teaching method.

During the initial individual interviews conducted with the participants, all of them acknowledged that they had learnt how to use the computer to a certain extent because somebody else had taught them. Not one of the participants obtained any computer skills through exploring the computer by themselves. I mostly received the following answers from the participants:

Researcher:	*And where did you learn how to use the computer?*
Sonny:	*Mmm, I know how to use the computer at home, my father taught me.*
Researcher:	*Where did you learn how to use a computer?*
Sharon:	*Hmm I learnt from my father… and my mother (smiles)*
Researcher:	*Did your sister teach you?*
Zelina:	*Yes, she only teach me when she know something (wrings hands).*

In conclusion, I have found that no significant learning had taken place among any of the two groups of children during the month in which I conducted and monitored these children's progress. The children themselves said that they did believe they would have been able to learn more, should the computer have functioned as it should have as depicted in the following quote:

Verona:	*Because all the time we go to the computers they are jammed and other times they are blank and other times there are many people there and then we can't work.*
Researcher:	*Okay, so you say you didn't learn anything because the computers were blank, it was jammed and there were too many people there?*
Verona:	*(nods head in agreement)*

Sharon and Sonny did show the different participants how to access different programs, but these children all claimed that they would not be capable of doing it on their own should they be alone at the Digital Doorway as depicted in the following quote:

Researcher:	*Seppie, will you be able to draw if you had to go there alone now?*
Seppie:	*No (shakes head in denial).*

Taking all of the above into consideration, it was once again impossible for me to obtain any meaningful answers to my second critical question, which was:

> *How did these children obtain computer skills without the guidance of a facilitator during the course of the Digital Doorway project in Atteridgeville?*

4. Conclusion

When I entered the field, I was very enthusiastic and highly motivated. I really believed that the Digital Doorway installations were the ideal mechanism to help alleviate computer illiteracy in the developing areas of South Africa. I was of the opinion the CSIR's Digital Doorway installations would function properly, that there would be support mechanisms in place and that the community would utilise the Digital Doorway equipment effectively.

I regarded the installation of a Digital Doorway in previously disadvantaged or rural areas as an excellent way to introduce and expose the majority of South Africans, whom I thought were mostly computer illiterate, to Information and Communication Technologies. I believed that it would lead to these people becoming computer literate and that it would provide a cost effective alternative to training people from the developing areas to become computer literate.

During the individual interviews as well as focus group interviews conducted with the participants, I found the CSIR had installed a computer in a community which cannot correctly be classified as a developing area. The Digital Doorway was installed adjacent to the community library where the community could use a computer for word processing and where they could gain access to the Internet at a minimal cost.

The librarians were given a key to reset the computer should they experience any problems with the Digital Doorway's equipment. They were not requested to visit the Digital Doorway

on a regular basis to observe whether everything was in working order or to contact the CSIR on a weekly or regular basis to report any problems. No support mechanisms were therefore in place. When I left the field approximately four weeks later, only two of the terminals were functioning properly and I doubt whether the CSIR was aware of the fact. The majority of the community would also be unable to access the computer as they did not know the usernames or passwords of the computer.

One of the three critical elements identified by the Department of Education (2003, p. 3) that could hamper ICTs' future, is sustainability. The Digital Doorway installation at Atteridgeville is a good example of a computer that has not been sustained. The community were not given ownership of the computer, they were unable to sustain the computer and the CSIR failed to sustain it for them.

The target population mostly found it impossible to learn anything at the computer as it was frequently not working properly. Whenever any learning did occur, the participants who knew something about a program, referred to by Mitra (2003) as the "know hows" would mostly show the others in his/her group the, "know nots", what to do. The onlookers, however, never got a chance to practise what was shown to them as only one or mostly two terminals were working. They therefore all claimed that they would not be able to do what the more knowledgeable had shown them.

During all the focus group interviews conducted to monitor the progress the children had made in obtaining additional computer skills, I realised that not one participant had obtained any additional computer skills at the Digital Doorway.

As stated in Chapter 1, I have mostly in the past followed a behaviouristic approach in teaching children computer skills. I do, however, believe that children are capable of obtaining additional computer skills by exploring the computer by themselves, thereby following a more constructivist approach, but only if they had previously been taught the basic skills needed and practised what they had been taught. I therefore believe in an initial teacher-centred approach in computer education as opposed to a learner-centred approach. During the research project I, however, realised that the teachers of the primary school the children attend, were insufficiently trained in computer skills and were therefore not capable of teaching these children computer skills or integrating ICT with the different learning areas.

In a study conducted by Kozma, McGhee, Quellmalz and Zalles (2004) it was found that:

> *…when technological infrastructure is developed in conjunction with appropriate teacher training, significant educational change can be achieved in developing countries. (p. 378)*

Kozma et al (2004, p. 381) found that learners will benefit if teachers are trained to integrate technology into the classroom. Kozma et al (2004, p. 380) claims that teacher training should include the use of ICT in the classroom practice.

Based on the study conducted by Kozma et al. (2004), I would recommend that the CSIR rather spend the money obtained for launching Digital Doorway installations in developing

areas countrywide first to train teachers how to operate the hardware and software of computers and especially how to incorporate ICT in the classroom situation. Kozma et al (2004, p. 381) believes that if teachers were trained to integrate ICT into the different learning areas, it would enable students in developing areas to participate in the information society and the global knowledge economy.

I agree with Kozma et al (2004) that it is necessary for teachers to receive training in computer skills and training on the integration of ICT in the different learning areas. If the teachers were adequately trained, I do believe the Digital Doorway installations will be utilised more effectively by the community as the "know hows" will teach the "know nots".

In conclusion, I would like to agree with the Department of Education (2003) that points out that the mere deployment of ICTs does not guarantee effective utilisation. The Digital Doorway in Atteridgeville was an excellent example of a computer that was not effectively utilised by the community as it was mostly not functioning as it should. This had a direct impact on obtaining computer skills by the participants as they reported:

Researcher:	*Why do you think you girls didn't learn anything?*
Verona:	*Because all the time we go to the computers they are jammed and other times they are blank and other times there are many people there and then we can't work.*
Researcher:	*Okay, so you say you didn't learn anything because the computers were blank, it was jammed and there were too many people there?*
Verona:	*(nods head in agreement)*

At times, when the computer was functioning properly, the participants only did on the computer what they had already learnt elsewhere. Those who had the knowledge showed the others what to do, but they in turn never had a turn to practise the skills with the result that they all admitted they would not be able to do anything by themselves should they visit the Digital Doorway alone.

During the whole research project, I therefore did not find that Minimally Invasive Education really had a significant or any influence on obtaining computer skills by the target population. I would like to conclude by agreeing with the findings of (Warschauer, 2002) on Minimally Invasive Education who claims that in practice Minimally Invasive Education is in fact Minimally Effective Education.

5. Recommendations

The CSIR are undertaking a tremendous task by establishing Digital Doorway sites in the developing areas countrywide, but some factors will have to be taken into consideration before installing any additional Digital Doorways.

I would recommend that the CSIR firstly do research about the needs of a community and a specific area before installing a Digital Doorway. There are so many rural and more

disadvantaged areas in South Africa than Atteridgeville where the need for computers and computer training is much greater. These areas should be taken into consideration before installing a computer in a community where half of the target population have computers in their homes.

I think it is essential that the CSIR appoint supervisors at the different Digital Doorway installations to oversee the functioning of the Digital Doorway's equipment and to report any malfunctioning directly to the CSIR. The CSIR should be in constant contact with the supervisor on a continuous basis to obtain first hand knowledge on the functioning of the Digital Doorway.

I would furthermore recommend that a short video be played on every terminal to introduce the community to the Digital Doorway concept and to show them the basic steps of getting started, for example what the usernames and passwords are and how and where to enter these. This short video can be played as a screen saver whenever the terminal is not in use.

The CSIR should consider Internet connectivity at every Digital Doorway installation. It was found during my research that the participants, who were only primary school learners, regarded Internet connectivity as important. According to them, they saw the website addresses of their favourite television program displayed on the television and they wished therefore that they could access these websites to learn more about their favourite programs. If primary school learners regarded this as important, I do believe that young adults would regard it as even more important.

The CSIR should do research with regard to the suitability of programs before installing them on the Digital Doorway's computers – the children, for example, indicated that they did not really like the geometry program. I would recommend that the CSIR visit the schools nearest to the Digital Doorway to determine what the children are doing in the different learning areas. Suitable software can then be installed for the children where they can find information about the specific learning material under discussion. The CSIR can then arrange with the teachers that the children visit the Digital Doorway installation to search for specific information to complete, for example, a given assignment. The integration of information communication technology should be encouraged in all the learning areas.

The specific primary school which the target population attend had a fully equipped computer centre, which had never before been used. During a conversation with the principal of the primary school, she claimed that the teachers were not adequately equipped to teach the children how to use the computer. I therefore believe that before spending money on installing upmarket computers countrywide at different Digital Doorways, the CSIR should rather use that money to train the teachers how to use the computers and how to integrate ICT in the different learning areas. This would eventually lead to a learning cycle where they teach the children and the children in turn teach their families.

6. Further research

During the research conducted in Atteridgeville, I increasingly became aware of the following questions that needed to be investigated in future.

- Why do the teachers at the primary school, which the children attend, not teach the children computer skills?
- Why do the teachers not integrate the different learning areas with the computer, although the children expressed a need for this?
- Why does the CSIR install a computer in an area where computer facilities and Internet facilities are available to the community at a minimal charge?
- Why is there no Internet connectivity at the Digital Doorway installed in Atteridgeville?
- Why were the children not that interested in the software programs installed on the computer?
- Why did the children only access the programs they knew?
- How did the children feel when they were unable to practise at the Digital Doorway?
- Why don't the CSIR appoint a supervisor to oversee the effective functioning of the computer?

7. Closure

Due to all of the above mentioned negative factors that were experienced by the learners and which deterred any significant learning to occur, my first critical question could not be answered as it could not be determined whether the children obtained any initial or any additional computer skills through the launching of the Digital Doorway project.

One positive aspect of the research project was, however, that I obtained valuable information with regard to the malfunctioning of the Digital Doorway installation at Atteridgeville which could be an isolated case. If the problems that were encountered at this site are representative then the CSIR should seriously consider making the necessary adjustments to the Digital Doorway installations throughout South Africa.

I found that mainly due to the many problems the children experienced in trying to gain real access at the Atteridgeville Digital Doorway installation, there was no significant learning amongst any of the children. Not one of the children obtained any additional computer skills at the Digital Doorway, although some of the children did become aware of how the computer basically functions and most of the children's initial knowledge about a computer's capabilities had increased.

Although no new computer skills were obtained, the participants did say that they learnt that it was possible to work together in a group. They therefore unconsciously acknowledged the value of collaborative learning, which to me was a very positive outcome.

In the case of the Digital Doorway installation in Atteridgeville Minimally Invasive Education was, as previously found in research conducted by Warschauer (2002) on the "Hole-in-the-Wall" experiment, more likely a case of Minimally Effective Education.

Appendix 1: Example of weekly schedule

Group name: _____

Date	Day	Time in	Time out	Problems	Comments (What could you do? What did you do?)
22/04/2005	Friday				
23/04/2005	Saturday				
24/04/2005	Sunday				
25/04/2005	Monday				
26/04/2005	Tuesday				
27/04/2005	Wednesday				
28/04/2005	Thursday				

Appendix 2: Letter of consent obtained from principal

University of Pretoria
Groenkloof Campus
6 April 2005

Dear Sir/Madam

I am currently doing research for the University of Pretoria on the Digital Doorway installed in Attridgeville.

The purpose of the research is to explore how children learn to use the computer without being taught by a teacher.

At this stage I would like to interview some of your learners on the following:

1. What he/she knows about a computer.
2. What he/she is able to do on the computer.
3. What he/she knows about the capabilities of a computer.

I can not, however, conduct this interview without your permission. I therefore request your permission to interview; videotape and tape reco my interview with your learner(s).

Please take note that your learner(s):

- Participation is voluntary;
- Identity and everything they share will be treated with the highest respect and confidentiality.

Your learner(s) may ask questions about any uncertainties and may discontinue his/her participation in this project at any stage.

Thank you very much for your willingness to co-operate.

Kind regards

Elize Fürstenburg

Principal

Appendix 3: Letter of consent obtained from the CSIR

Letter of consent from the CSIR

From: "Ronel Smith" <RSMITH2@csir.co.za>
To: <efurstenburg@absamail.co.za>
Subject: Digital Doorway navorsing
Date: 26 November 2004 11:21 AM

Elize,

Ek sal 'n brief op 'n briefhoof vir jou stuur maar moet dit by ons regsdienste verby vat. Ek hoop die e-mail sal doen vir nou.

Ronel

Hiermee bevestig ek dat jy toestemming het om navorsing oor die Digital Doorway projek vir die Universiteit van Pretoria te doen op 'n installasie(s) wat tussen jou en die CSIR ooreengekom sal word. Jy moe asseblief jou proposal vir my stuur ter insae sodat ons ooreenstemming het oor die aard van die navorsing. Jy mag enige materiaal / data wat deur die CSIR aan jou verskaf word vir jou navorsing gebruik, mits die CSIR as bron van die inligting erken word en kopie reg gerespekteer word.

Ronel Smith
Project Manager
CSIR Information Society Technologies Centre
PO Box 395, Pretoria, 0001, South Africa
Tel : +27 12 841-3104
Fax: +27 12 841-4829
Mobile: +27 83 600 4424
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Appendix 4: Letter of consent obtained from participants' parents

University of Pretoria
Groenkloof Campus
7 April 2005

Dear Sir/Madam

I am currently doing research for the University of Pretoria on the Digital Doorway installed in Atteridgeville.

The purpose of the research is to explore how children learn to use the computer without being taught by a teacher.

At this stage I would like to interview some of your learners on the following:

- What he/she knows about a computer.
- What he/she is able to do on the computer.
- What he/she knows about the capabilities of a computer.

I can not, however, conduct this interview without your permission. I therefore request your permission to interview; videotape and tape record my interview with your learner(s).

Please take note that your learner(s):

- Participation is voluntary;
- Identity and everything they share will be treated with the highest respect and confidentiality.

Your learner(s) may ask questions about any uncertainties and may discontinue his/her participation in this project at any stage.

Thank you very much for your willingness to co-operate.

Kind regards

Elize Fürstenburg
Researcher

Principal

GAUTENG DEPT. OF EDUCATION
TSHWANE SOUTH D4
BUD-MBELLE PRIMARY SCHOOL
P.O. Box 52 Atteridgeville 0008
Tel/Fax: (012) 373 8854
Date: 07/04/05 Principal:

University of Pretoria
Groenkloof Campus
7 April 2005

Dear _____

I am currently doing research for the University of Pretoria on the Digital Doorway installed in Atteridgeville by the CSIR.

The purpose of the research is to explore how children learn to use the computer without being taught by a teacher.

At this stage I would like to interview your child on the following:

1. What he/she knows about a computer.
2. What he/she is able to do on the computer.
3. What he/she knows about the capabilities of a computer.

I can not, however, conduct any interviews without your permission. I therefore request your permission to interview; videotape and tape record my interviews with your child (please view dates, times and venues of interviews on the last page).

Please take note that your child's:

- Participation is voluntary;
- Identity and everything they share will be treated with the highest respect and confidentiality.

Your child may ask questions about any uncertainties and may discontinue his/her participation in this project at any stage.

Thank you very much for your willingness to co-operate.

Kind regards

Elize Fürstenburg
Researcher

I, _____, parent of
_____ in Grade _____ hereby give permission that he/she may participate in the research project.

Signed: _____
Date: _____
Contact number: _____
Please sign and return to principal on Friday 8 April 2005

Appendix 5: Questions posed during semi-structured interviews

Biographical information							
Name:			Age:		M	F	
School:			Grade:				
Family	Father	Mother	Brothers		Sisters		
Occupation							

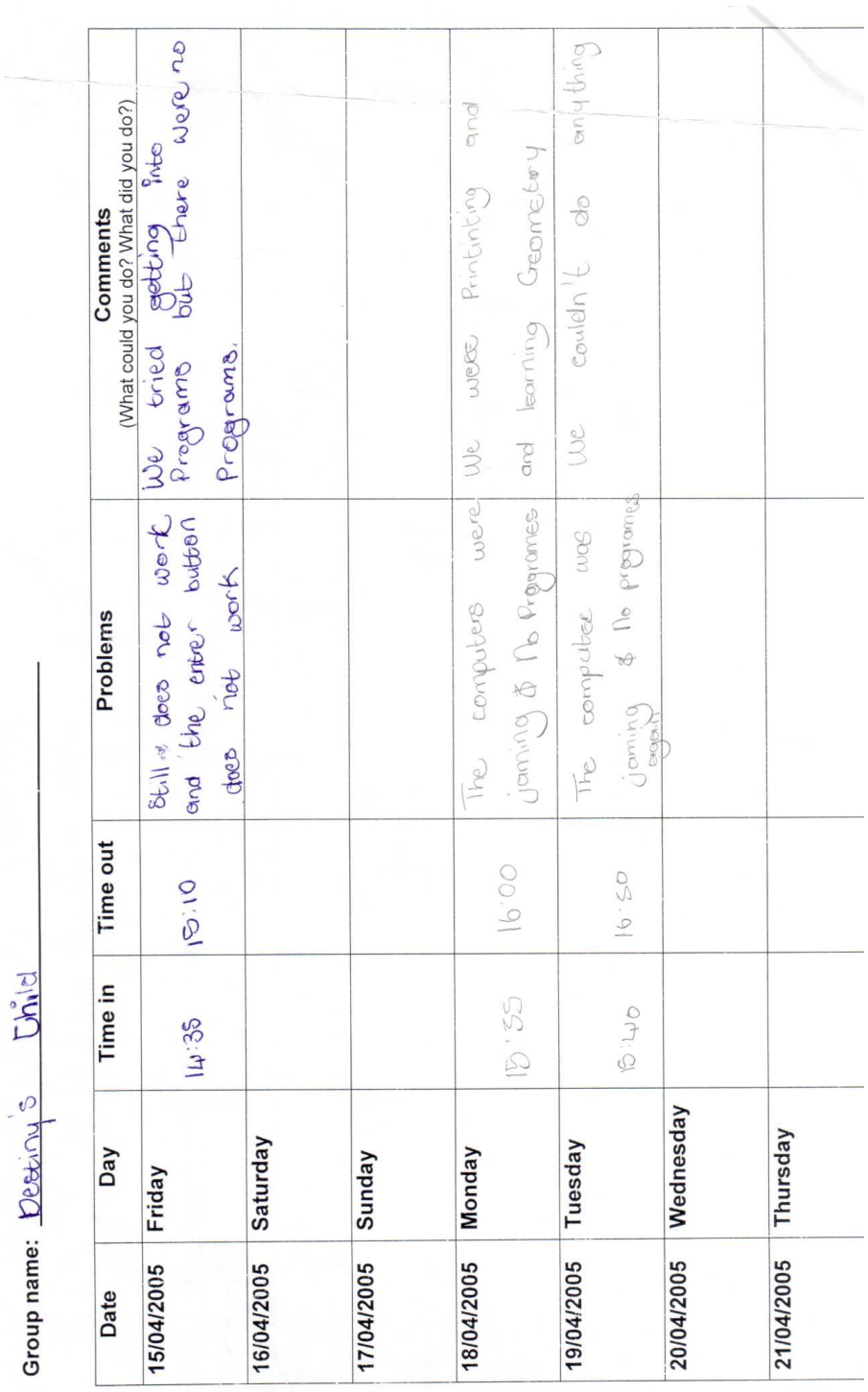
Questions to be posed			
Question	**Coding**		**Remarks**
Do you know how to use a computer?	Yes		
	No		
Do you know how to use a computer?	Yes		
	No		
Where did you learn how to use a computer?	**Remarks:**		
Do you have a computer at home?	Yes		
	No		
What do you do on your computer at home?	Write letters		
	Send e-mail		
	Paint		
	Use the Internet		
	Other		
What would you like to be able to do with the computer?	Write letters		
	Send e-mail		
	Paint		
	Find jobs / Internet		
Do you think you will be able to teach yourself how to use the computer supplied to your community by the CSIR?	Yes		
	No		
What do you think one is capable of doing with a computer?	**Remarks:**		

Appendix 6: Completed schedule for week 1 (girls)

Group name: Destiny's child

Date	Day	Time in	Time out	Problems	Comments (What could you do? What did you do?)
07/04/2005	Thursday	15 : 08	15 : 30	The copters germ and we can't get a chance to a copter	
08/04/2005	Friday				
09/04/2005	Saturday				
10/04/2005	Sunday				
11/04/2005	Monday				
12/04/2005	Tuesday				
13/04/2005	Wednesday				

Appendix 7: Completed schedule for week 2 (girls)



Group name: Destiny's Child

Date	Day	Time in	Time out	Problems	Comments (What could you do? What did you do?)
15/04/2005	Friday	14:35	15:10	Still it does not work and the enter button does not work	We tried getting into Progarms but there were no Progarams.
16/04/2005	Saturday				
17/04/2005	Sunday				
18/04/2005	Monday	15:55	16:00	The computers were jaming & No Programes	We wese Printing and and learning Geometry
19/04/2005	Tuesday	15:40	16:50	The computee wos jaming & No programs again	We couldn't do anything
20/04/2005	Wednesday				
21/04/2005	Thursday				

Appendix 8: Notification of change in schedule

Jniversity of Pretoria
Groenkloof Campus
Pretoria
0027

21 April 2005

Dear *Mrs Mahlangu*

The different meetings I have had with the children participating in the research project have been so insightful and rewarding and I think both me and the children have thoroughly enjoyed the sessions.

Unfortunately I had to reschedule my meeting with the children for next Thursday, 28 April 2005. I have now arranged with Mrs Ruth that I will see them at school on Friday, 29 April 2005. I will have a discussion with the girls from 12:30 to 13:00 and with the boys from 13:00 to 13:30.

Please feel free to contact me should you have any enquiries.

Thank you for your co-operation in this regards.

Kind regards

Elize Fürstenburg
Cell: 082 895 2965

Appendix 9: Status of Digital Doorway in Atteridgeville

Elize Fürstenburg

From: "Ronel Smith" <ronel.smith@mikom.csir.co.za>
To: "Elize Fürstenburg" <efurstenburg@absamail.co.za>
Sent: 22 April 2005 06:31 PM
Subject: Re: Digital Doorway

Elize,

die Digital Doorway is operasioneel.

Ronel

----- Original Message -----
From: Elize Fürstenburg
To: Ronel Smith
Sent: Friday, April 22, 2005 6:02 AM
Subject: Re: Digital Doorway

Ronel

Ek het vergeet om gister vir jou te sê, maar volgens die kinders werk die "enter" sleutel nie meer op die sleutelborde nie! Ek kon dit egter nie self toets nie, aangesien die rekenaars af was.

Lekker naweek.

Elize

Appendix 10: Completed schedule for week 3 (girls)

Group name: Lastings Child

Date	Day	Time in	Time out	Problems	Comments (What could you do? What did you do?)
22/04/2005	Friday	1:80	10:03	The computers were all germed at all	we did not do nothing
23/04/2005	Saturday	14:00	14:04	I was alone I could not do anything.	Nothing
24/04/2005	Sunday	13:30	16:14	I was also alone also I could not do any thing	Nothing
25/04/2005	Monday	14:20	14:30	The internet was not working	Nothing
25/04/2005	Tuesday	14:30	15:00	They were not working, all of the.	Nothing
27/04/2005	Wednesday			HOLIDAY	Nothing
28/04/2005	Thursday				

Appendix 11: Notification of change in schedule

Jniversity of Pretoria
Groenkloof Campus
Pretoria
)027

29 April 2005

Dear *Mr and Mrs Skhosana*

The interviews conducted with the children at the school, proved to be more convenient for the children opposed to the meetings held at the community library. I have therefore decided, after receiving consent from the principal, that we will be having our last meeting on Friday, 6 May 2005, at the school. I will once again meet the girls from 12:30 tot 13:00 and the boys from 13:00 to 13:30.

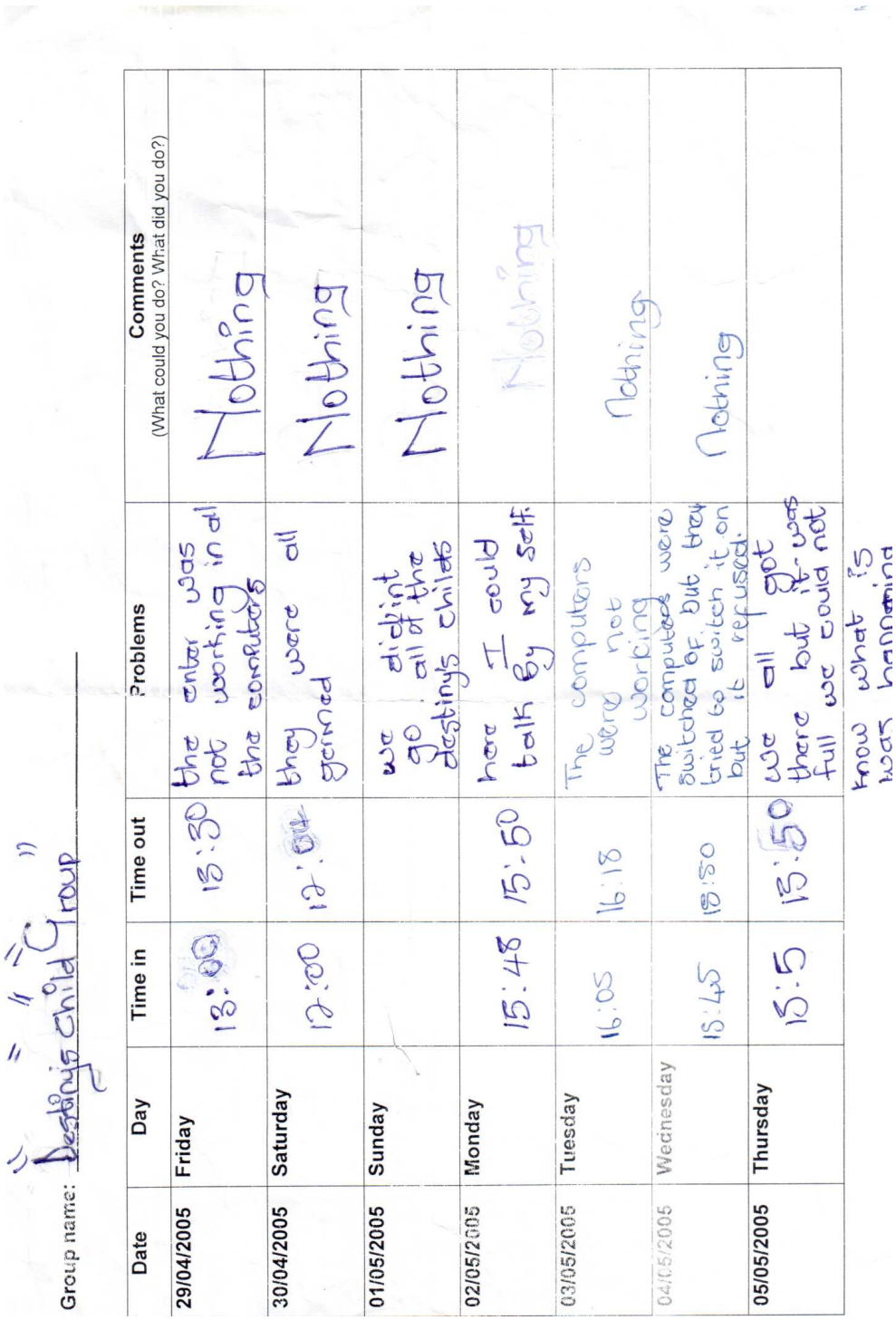
Thank you once again for your patience and co-operation throughout this research project. I really do appreciate it.

Kind regards

Elize Fürstenburg

Cell: 082 895 2965

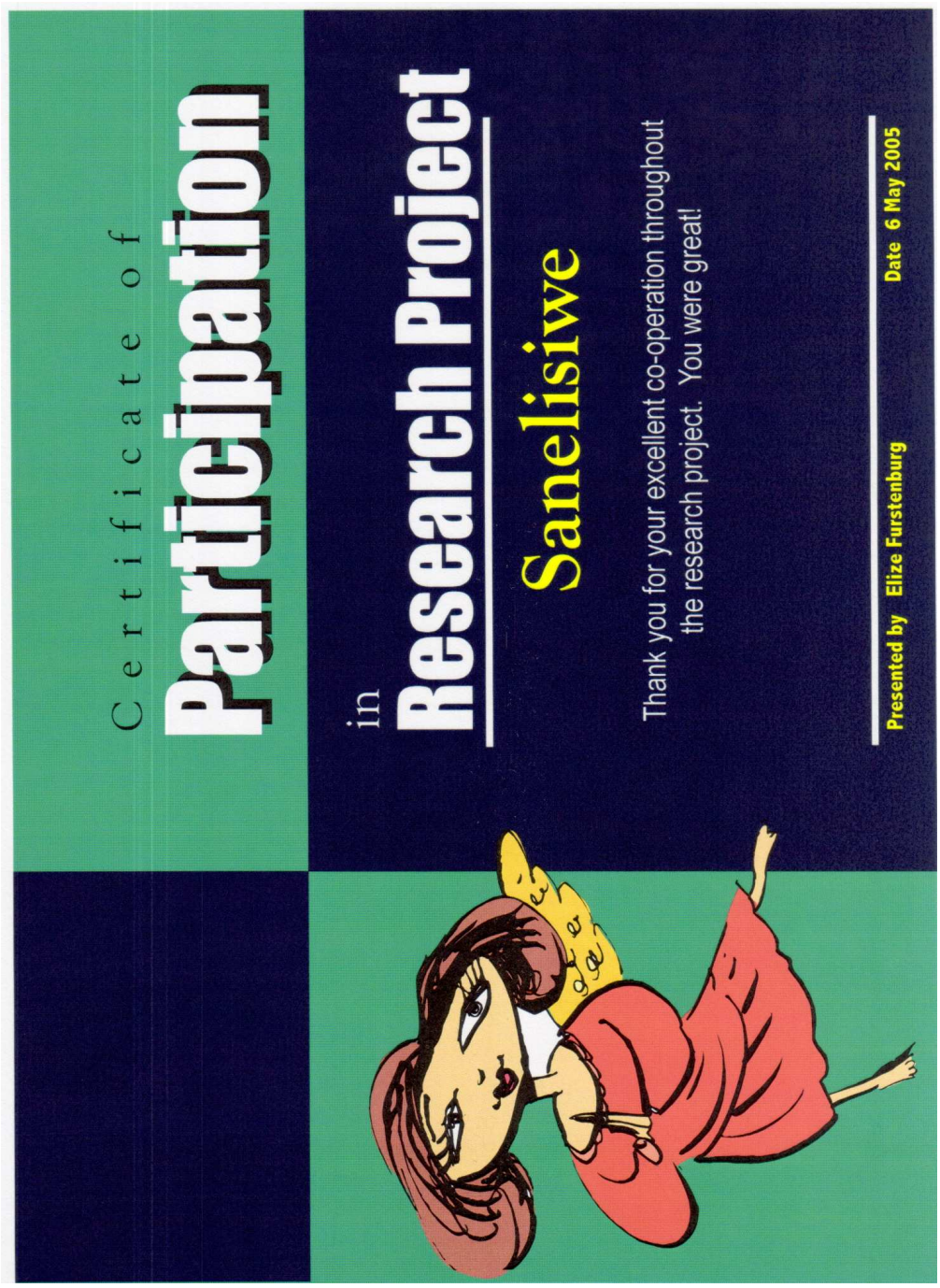
Appendix 12: Completed schedule for week 4 (girls)



Group name: Destinys Child Group

Date	Day	Time in	Time out	Problems	Comments (What could you do? What did you do?)
29/04/2005	Friday	18:00	18:30	the enter was not working in all the computers	Nothing
30/04/2005	Saturday	12:00	12:00	they were all ginned	Nothing
01/05/2005	Sunday			we didint go all of the destinys childs	Nothing
02/05/2005	Monday	15:48	15:50	here I could talk by my self	Nothing
03/05/2005	Tuesday	16:05	16:18	The computers were not working	Nothing
04/05/2005	Wednesday	15:45	15:50	The computers were switched of. But they tried to switch it on but it refused.	Nothing
05/05/2005	Thursday	15:5	15:50	we all got there but it was full we could not know what is was happening	

Appendix 13: Certificate of participation awarded to girls

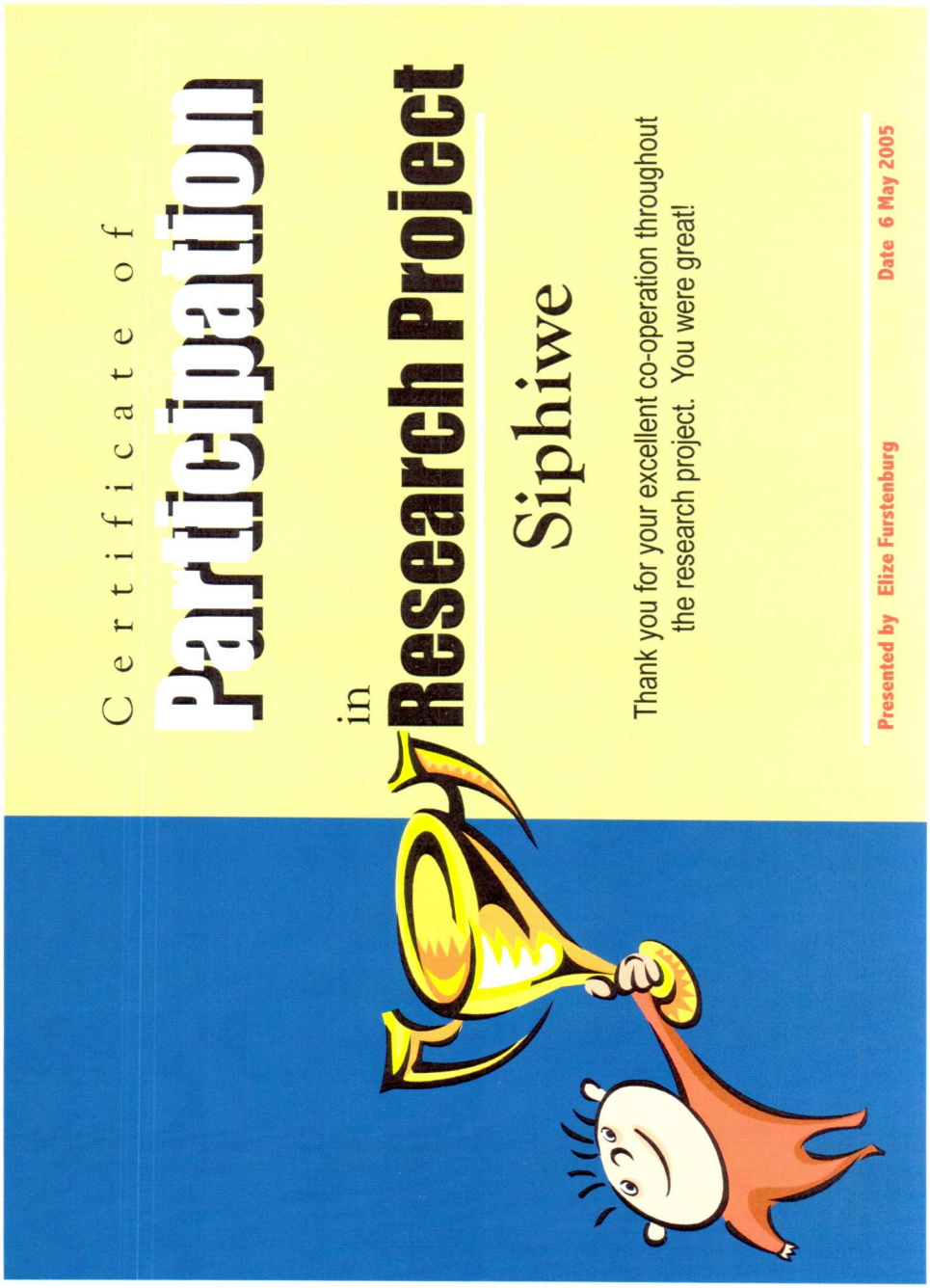


Appendix 14: Completed schedule for week 4 (boys)

Group name: _____

Date	Day	Time in	Time out	Problems	Comments (What could you do? What did you do?)
29/04/2005	Friday	15:30	16:00	no	Games and Drawing
30/04/2005	Saturday				
01/05/2005	Sunday	////		mistake no pointes	
02/05/2005	Monday	15:00	15:30	no pinters	teaching How to type
03/05/2005	Tuesday	14:30	15:00	no	Playe/ games only
04/05/2005	Wednesday				
05/05/2005	Thursday	15:00	14:00	Tired	no

Appendix 15: Certificate of participation awarded to boys



Appendix 16: Population of Atteridgeville

Atteridgeville: 9 Wards	
Ward 03	8,652
Ward 07	13,638
Ward 51	20,143
Ward 55	25,424
Ward 62	21,209
Ward 63	13,764
Ward 68	21,277
Ward 71	16,946
Ward 72	23,927
Total	**164,980**
Mamelodi: 8 Wards	
Ward 06	22,607
Ward 10	37,479
Ward 15	22,884
Ward 16	20,320
Ward 17	46,965
Ward 18	31,924
Ward 23	25,415
Ward 28	31,516
Ward 38	5,787
Ward 67	21,677
Total	**266,574**

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