

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:	<p>The people are capable of seeing and using the following equipment:</p> <ul style="list-style-type: none"> – Terminal; – Keyboard; – Touch mouse.
Objectives:	<p>The objectives of the Digital Doorway are to:</p> <ul style="list-style-type: none"> – “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: <ul style="list-style-type: none"> – 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.

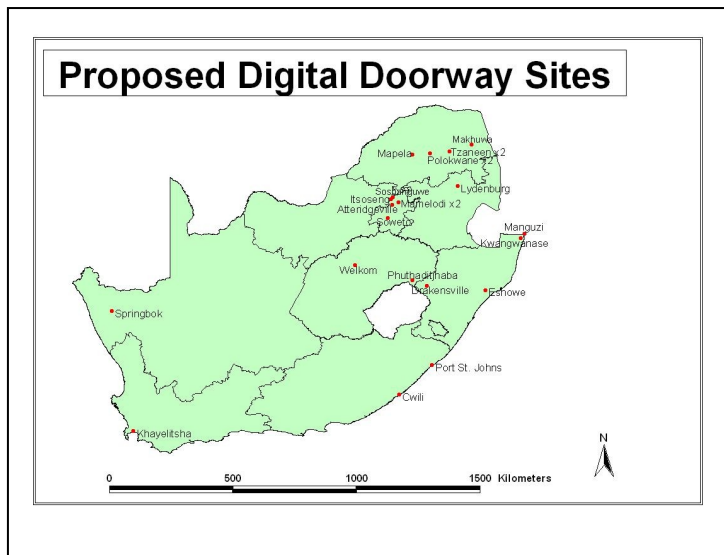


Figure 2: Proposed Digital Doorway Sites (Smith, Ronel "personal communication," February 1, 2005)

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.

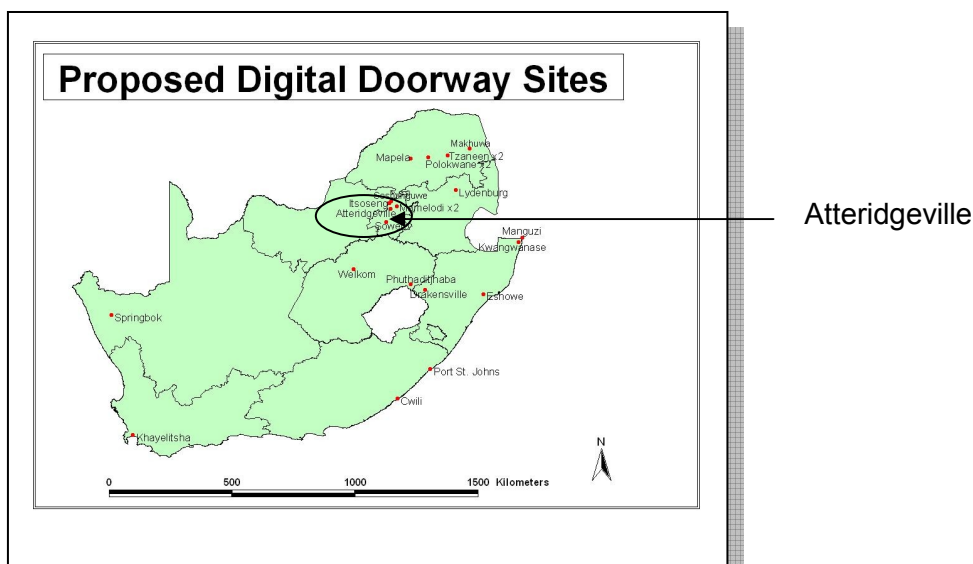


Figure 3: Atteridgeville (Smith, Ronel "personal communication," February 1, 2005)

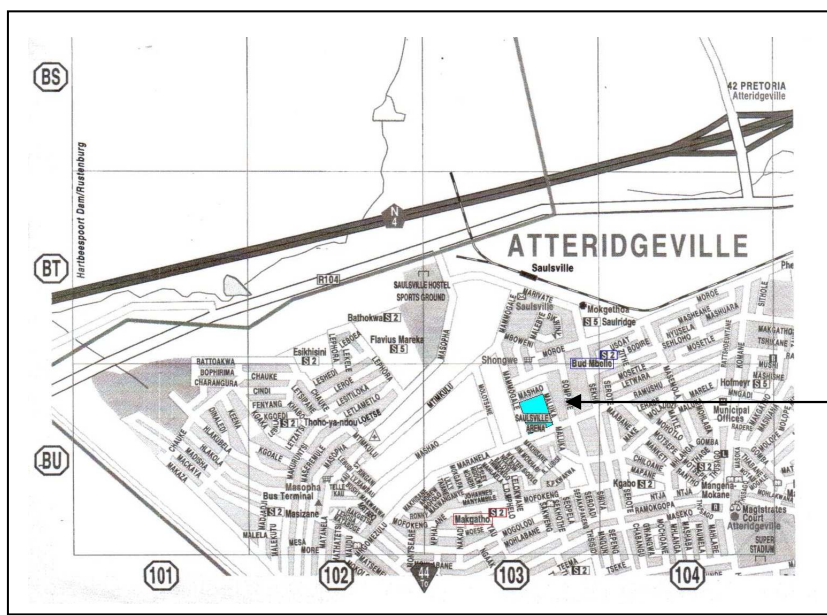
5.1 Installation of Digital Doorway Equipment

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).



Saulsville Arena

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.



Saulsville Arena

Post Office

Library

Digital Doorway

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.

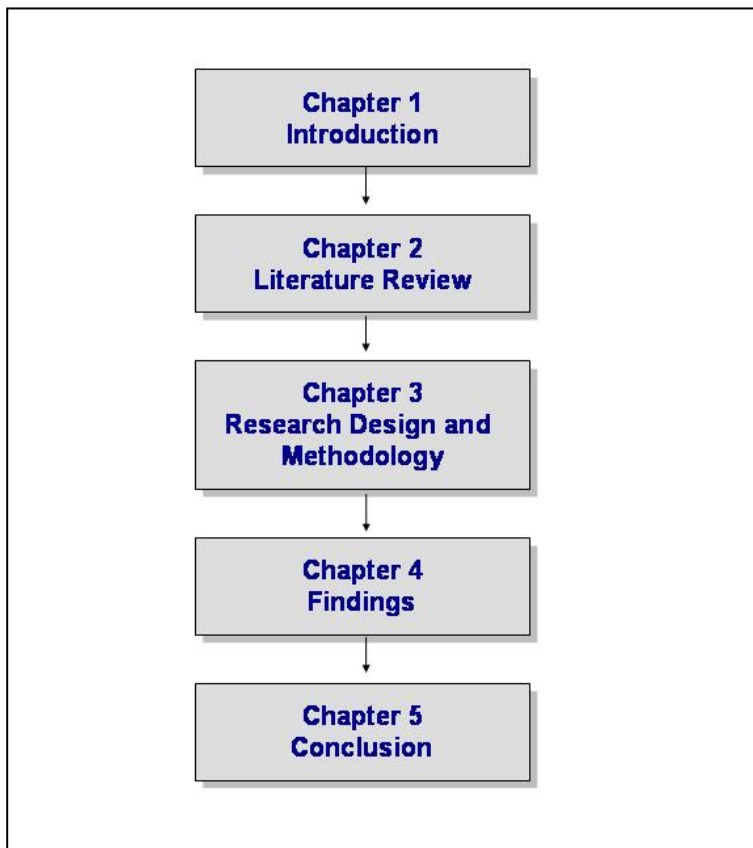


Figure 10: Diagrammatic illustration of structure of research study

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	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – 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	<p>Description of the:</p> <ul style="list-style-type: none"> – Research instruments; – Data collection plan; and – Data analysis.
Chapter 4: Findings	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – Summary of the research findings; – Conclusion; – Recommendations.