An Initial Investigation to

Voluntary and Unstructured Access to Computing

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An Initial Investigation to

Voluntary and Unstructured Access to Computing

Presented by

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Above all, to God, my guide through life.

Summary

"The acquisition of basic computer skills by any set of children can be achieved through incidental learning, provided the learners are given access to a suitable computer facility, with entertaining and motivating content and some minimal guidance" (Mitra, 2002).

There are great demands on education, which call for a new concept of teaching. The traditional obtaining of a qualification and then working in that field has become redundant. Today, because of rapid change and lifelong, on-going learning, the acquisition of communication skills and the ability to find the necessary information, are vital. These demands require creative and critical thinking to make provision for the explosion of information technology in a world that contains a large population of people without the means to obtain the necessary skills.

A computer, connected to the Internet, was placed in Mamelodi, in South Africa, without any instructor to teach the people how to use it. This initiative came from the CSIR after a similar successful project in Cwili in the Eastern Cape. Initially Sugata Mitra of the Centre for Research in Cognitive Systems launched such projects in India.

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Chapter I: Introduction

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1 Introduction

According to President Mbeki (Smith et al, 2003)

"*…we have to ensure that as many of our people as possible master modern technologies and integrate them in their social activities, including education, delivery of services and economic activity*".

The ability to access and the manpower to instruct computer and Internet usage will hamper this obligation. The continuing growth of the Global Information Society will have intense implications for African countries ("Africa on the Internet", 1996). Some fear that it will enlarge the gap between those who are linked up and those who are not, and marginalize Africa even more (Kilbride et al, 2001). The Digital Doorway project aims to overcome these hurdles in a developing country where only a few have access to the necessary equipment to fulfil President Mbeki's vision (Smith et al, 2003).

The idea of unsupervised learning came from an experiment started in India, pioneered by Professor Sugata Mitra of the Centre for Research in Cognitive Systems (CRCS). In February 1999 he initiated the idea of *Minimally Invasive Education* (MIE). Mitra placed computers in rural areas of India with no instructor available to help the people to use it. The name "Hole in the Wall" was given to the project, because the computer's screen was placed on the outside of a wall (See diagram 1 and 2). He proposed that basic computer skills could be acquired by children through incidental learning. He got innovative results from these experiments (Mitra, 2000). Research showed that while it might appear that all children were doing was playing for fun, it was actually a much more important part of a child's developmental and learning process (Webb, n.d.).

A similar project was launched in South Africa by the CSIR in November 2002. An unsupervised computer was installed in Cwili in the Eastern Cape (Smith et al, 2003). Due to the success of the Cwili experiment, another computer was placed in Mamelodi, a township in Gauteng (South Africa). In South Africa these experiments, meant to bridge the digital division, are called "Digital Doorway".

This study was an initial investigation of the Mamelodi Digital Doorway project to research voluntary and unstructured access to computing.

2 Background

"*What is the 'lightest' way to train children to use computers? Do poor, illiterate children find it harder to use a PC than rich, literate kids?*" (Mitra, 2000).

Mitra (2000) initiated his experiments in India with this proposed question. He believed that this project paved the way to introduce a possible method to bring computer literacy to all people.

2.1 Methodology of Learning

"*Constructivism claims that learners can only interpret information in the context of their own experience, and that learning is individualistic*" (De Villiers, 2002).

Learners remodel how they learn and often set their own goals. The emphasis in constructivism is on learning, and not on teaching. Technology is used to promote learning, and not to teach. Learners have to construct their own understanding and content can therefore not be pre-defined. Reflex awareness is developed as a way of knowledge construction. This awareness incorporates new information to uncomplicated, pre-existing concepts, where they amend their understanding in the light of new data (Mitra, 2000). During research in child development, two important characteristics of this learning theory are play and experimentation (Herron et al, 1971).

Collaborative and co-operative learning take place when groups of people work or learn together. In this process they share construction of learning and ideas (Balkcom, 1992). These are efficient learner-learner-educator paradigms. This paradigm is mainly in the framework of interactive environments. Growing research on this learning demonstrated the benefits of children working with other children. They shared the process of constructing their ideas when they collaborated (Rysavy et al, 1991).

Minimally invasive education (MIE) is a pedagogical strategy where learning takes place with the environment as motivation and minimal or no intervention by a teacher. An example of such learning is when a learner builds a puzzle with no help from a parent. Electronic devices like computers are known to attract people. Children spontaneously investigate computers with minimal assistance or supervision. This leads to the suggestion that computers can be the ideal tool to investigate MIE (Mitra, 2002).

The collection of new information is essential to a rapidly changing economy. One of the best ways to search for new information, if one has access to a computer, is by using the World Wide Web. The Internet is a recognised tool to promote constructivist learning. It provides an adequate level of curiosity that promotes learning among children.

2.2 The Hole in the Wall Experiments

Marmar Mukhopadhyay was the first researcher who conducted Hole in the Wall experiments in India by placing computers in a school in the village of Udang. Children could use them with minimal instructions (Zielenziger, 1995). Word processors, spreadsheets and data management systems were available on these computers. Both teachers and students learned computer skills on these computers with minimum instruction. The latest technology was used in the selection of the computers used for the kiosks. They had colour monitors and multimedia support. The computers were connected to the Internet.

Mitra then conducted experiments and placed one computer in Kalkaji, New Delhi. A town of Shivpuri was chosen for a similar experiment. The kiosk was installed outdoors on the outside of a building. This method led to the name "*the-hole-in-the-wall experiment*" (Mitra, 2000). The reason for the name can clearly be seen in Figures 1 and 2.

Figure 1: The Shivpuri kiosk, obtained from the Internet at http://www.niitholeinthewall.com/Paper1.htm

Figure 2: **Children examining the Kalkaji kiosk on the first day, obtained from the Internet at http://www.niitholeinthewall.com/Paper1.htm**

The computer was constructed at the site without any guidance or supervisor. There was no manual or instructions to show the people what to do. The aim was that the children trained themselves to use computers without adult supervision (Judge, 2000).

Regular users in most of these experiments were young children and teenagers. Most of them did not have any prior experience with computers and some of them did not understand English. These children experimented and most of them obtained a reasonable amount of computer literacy. A trial and error approach was followed. They also explored on the web where they played games and downloaded music. Mitra (2000) concluded that computer literacy did not need to be a privilege of educated people who could afford it. It could be available to other people without the need to employ instructors. Table 1 lists the key observations from the Kalkaji experiment.

Table 1 The key observations from the Kalkaji experiment

Once available, the kiosk was used immediately by children (about 5 to 16 years old).
These children had a very limited understanding of the English alphabet and could not speak the language.
Children learnt basic operations of the PC for browsing and drawing within a few days.
Adults, both men and women, did not attempt to learn or use the kiosk.
MS paint and Internet explorer were the most commonly used applications.
Children formed impromptu classes to teach one another.
Children invented their own vocabulary to define terms on the computer, for example, "sui" (needle) for the cursor, "channels" for websites and "damru" (Shiva's drum) for the hourglass (busy) symbol.
Within a month of interaction, children were able to discover and use features such as new folder creation, cutting and pasting, shortcuts, moving/resizing windows and using MS Word to create short messages even without a keyboard.
Children were strongly opposed to the idea of removing the kiosk.
Parents felt that although they could not learn the operation of the kiosk (or did not see its need) they felt that it was very good for the children.

In both cases, it was found that all participants achieved a working knowledge of the Windows operating system. They could click, double click, and launch applications like Paint and Word. Because of the success of these experiments, more kiosks were constructed in rural areas of India. There are currently more than sixty operative kiosks in India.

2.3 The Digital Doorway Project

The Council for Science and Industrial Research (CSIR) conducted a similar experiment in South Africa, called the Digital Doorway Project. A remote village in the Eastern Cape, Cwili, was selected as the first of about ten possible future pilot projects. Cwili is a rural community of 2 600 people. Unemployment is a serious problem. The main income is farming and domestic work. There were only four young adults who were able to use a computer. The local primary school had six computers with only one operational (Russell, 2002). The kiosk was installed late in 2002 on the veranda of the community hall. This building was a main building next to a main road that people used to enter the village. The project intended to introduce computer literacy into the sphere and experience of these rural people. The aim was to make the kiosk available 24 hours of the day. It provided access to a multimedia computer providing access to various applications and the Internet (Smith et al, 2003).

Professor D. Russell, professor emeritus of adult education at the University of the Witwatersrand, was contracted to evaluate the kiosk. In his evaluation report, he stated that

"*…all Kiosk participants, both children and young adults, have moved from an initial state of complete computer illiteracy to a state where the computer is used with great confidence and an awareness of some of its exciting multiple uses*" (Russell, 2002).

According to Russell (2002) different groups of youngsters, aged seven to sixteen, were actively involved in the kiosk from early morning until dusk. The kiosk was mostly used for typing of letters, paging through the Internet, drawing with Paint and playing games. Table 2 lists the key elements in the Cwili experiment.

Table 2 Key elements in the Cwili experiment

Different groups, aged seven to sixteen, actively used the kiosk.
Keyboard input was limited.
Short messages were typed and a few were captured.
The number of Kiosk computer participants was counted. This number reached a peak in December 2002.
During the December holidays, six relative experienced computer participants visited the village and their influence raised the computer awareness levels.
The number of computer participants declined sharply after the schools had opened in the middle of January.
The level of assistance given to Kiosk participants was kept to a minimum.

After a few months, it could be seen that all Kiosk participants had moved from an initial state of complete computer illiteracy to a stage where the computer was used with great confidence.

The CSIR installed the second Digital Doorway kiosk in Mamelodi, a township in South Africa. The setting here is different from the other mentioned projects:

- It is not a remote rural township.
- Computers are sometimes available to some people.
- Some people are computer literate.

The Mamelodi Digital Doorway computer is loaded with OPEN SOURCE or Freeware programs. A detailed description of the setting of the computer can be seen in Addendum 1.

A concealed video camera was placed in the kiosk to record the people around the computer. The videos recorded by this camera had been used for this study. Initially no voice recordings, screen captures or keystrokes were recorded. This study had been done after observing the people and their behaviour in front of the computer. The observations included the participants as well as the spectators.

3 Physical Framework

The following is a detailed description of the physical framework of this project with photos and diagrams, as provided by the CSIR.

3.1 Inside the Kiosk

The computer is situated in a corner of the kiosk. It is fixed to the wall and cannot be removed. All the components, such as the screen, the keyboard and the computer form a single unit with the stand. The height of the screen is approximately 1,2m from the ground. There is a footstool for smaller children who cannot reach the screen and the keyboard. Figure 3 shows the computer in the kiosk.

Figure 3: The Computer in Mamelodi (Obtained from videos provided by the CSIR)

3.2 Setting

The kiosk is situated next to a busy access road that is used to enter the township. There are always people present and merchants sell food next to the kiosk. It is a save venue with a lot of passers-by.

The following photograph, Figure 4, shows the kiosk from the outside.

Figure 4: Outside the Kiosk in Mamelodi

3.3 Digital Doorway Architecture

Figure 5 provides a high-level overview of the Digital Doorway computer installed in Mamelodi.

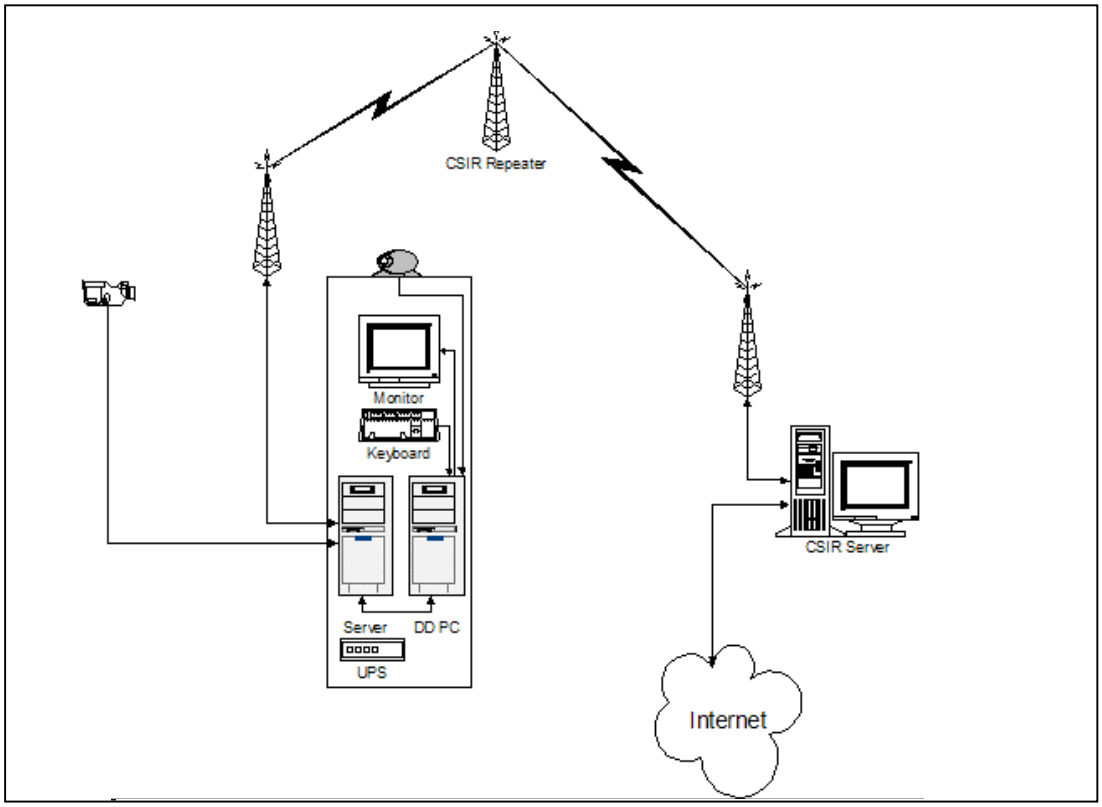

Figure 5: High-level Digital Doorway Architecture

3.4 Mamelodi Building Site Plan

Figure 6 shows the actual positioning of the Digital Doorway equipment inside the kiosk at the Mamelodi MPCC.

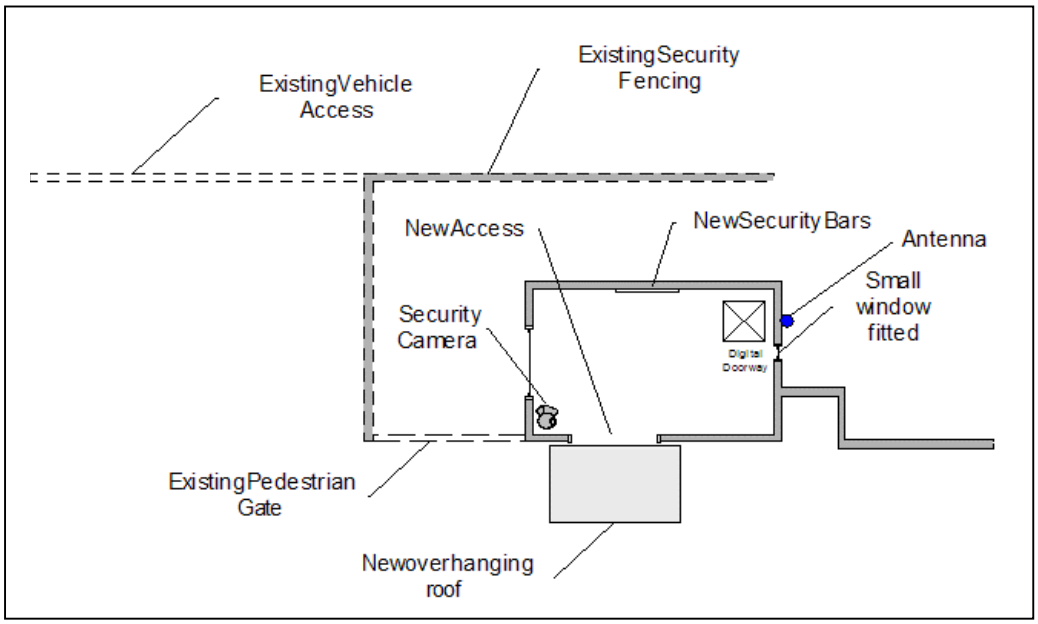

Figure 6: Mamelodi Building Site Plan

3.5 System Configuration

The basic system interconnection is diagrammatically represented in Figure 7. The client PC is a single fixed unit, placed in a corner of the building. It is connected to the Internet at all times. The server is located at the CSIR. The connections between the two is via satellite. A video web camera is placed opposite the computer from where spectators and people using the computer are recorded 24 hours of the day. A detailed description can be seen in Addendum 1.

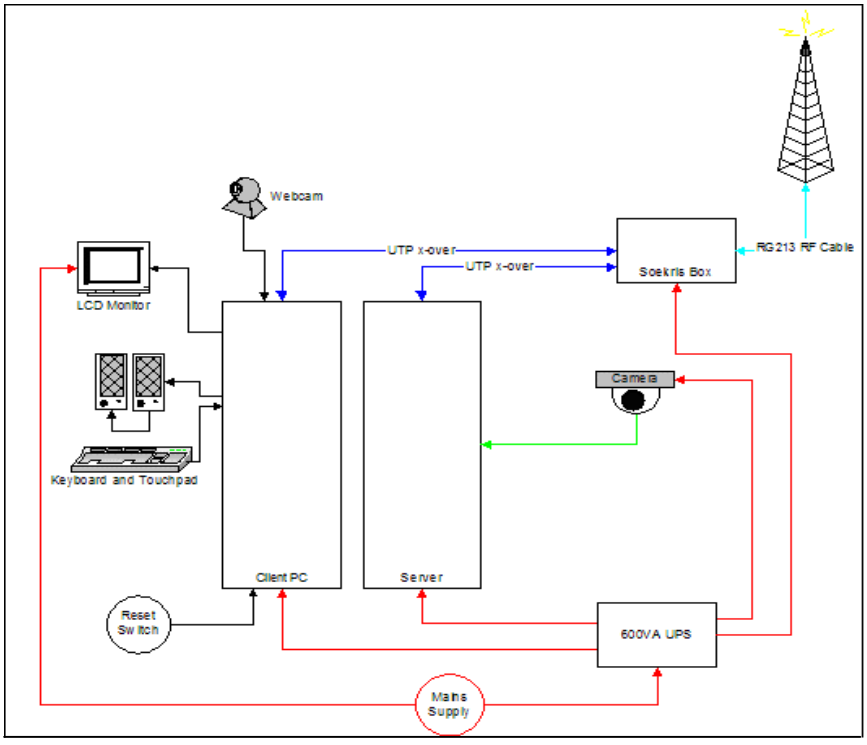

Figure 7: Mamelodi Digital Doorway Interconnection

4 My Involvement

The Cwili project was evaluated and research data was available. The next project was the Mamelodi Digital Doorway project. The CSIR wanted independent researchers to assess the situation. The University of Pretoria was contacted to assess this project. My role was to do an initial investigation of the project and to determine in which areas further research should be done.

5 Objectives of this Study

The following key issues were identified after an initial screening of some of the video material:

- Is it worthwhile for the CSIR to construct such sites and maintain the expensive computer equipment?
- Physical framework:
  - Could the participants see the computer screen?
  - Could the spectators see the computer screen?
  - Was there room for spectators?
- Relating the use of the facilities by the participants:
  - How did they interact with the computer and with each other?
  - What time of the day did they use the facility?
- The participants and the spectators:
  - Of what gender and age were the participants?
  - How long did they stay?
  - To what extend did spectators participate?
  - Were there signs of a pecking order?
  - Was there any evidence of learning taking place?

These key issues led to objectives of this study, which can be summarised as:

- To note the observations of the daily events as they happened. The above-mentioned points were then analysed and summarised.
- To interpret the social interaction of the participants and the spectators.
- As this was an initial study to observe and map the project, recommendations for further research on the project were made.

These objectives led to the research questions.

6 Research Questions

The investigation was executed with the following research aims:

Describe the observations when viewing the video material.

Describe the activities and the tendencies of the participants in the setting.

Describe the interactions of the participants and the spectators with each other and with the computer.

Explore and map the events at the computer kiosk in Mamelodi.

This study will seek to resolve these issues.

7 The Value of this Research

This project of the CSIR is an approach to explore the demand for continued learning in the e-learning field. This study can be a guide to the feasibility to erect more sites like Digital Doorway, Mamelodi.

Further research should show if learning is taking place and if these children can be part of the digital community that is evolving. If learning is taking place, then the education system can benefit from findings of more extensive studies of this project.

These experiments may ensure that more people, who do not have access to computers, can become computer literate.

This initial investigation will lead to more research questions for further studies.

8 Methodology

In this study I used observational research where the concern is not necessarily obtaining a right or wrong answer, but to observe the behaviour of the participants directly. The advantage of this technique is unbiased observation, rather than self reported behaviour. In this qualitative observational research the essential model had to be determined. This data gathering technique implicated building on an earlier study.

With this method first-hand data was gathered on the processes and behaviour studied. According to Fox (1998) a holistic perspective, i.e. an understanding of the context within which the project operates, can be reached by observing operations and activities. Observation may be especially important where it is not the event that is of interest, but rather how that event may fit into, or be impacted by, a sequence of events.

This research consisted partially of an inquiry where data was collected by observing the participants of the computer in the kiosk. In this study group and individual interactions and behaviours were recorded. The interactions of the participants and the spectators with each other, as well as with the computer, were studied.

The primary method of data collection was the observation of the participants at the computer in the kiosk. The data was recorded over a period of six weeks. It started on the day that the computer was installed, December 6, 2004. A concealed video camera captured this data. These videos were stored on the file server at the CSIR. A video usually covered a period of one hour. It was stored under a name consisting of the date as well as the time of the recording. It was available in MPEG format on electronic devices. The videos were then observed on a computer. The time frame for the observation was limited to the time between 10h00 and 16h00 because the kiosk was mostly empty at other times. No keystrokes were recorded and, at the time of this study, no screen captures were made. The sound on the video was mostly inaudible.

The focus of the observations was decided beforehand, and is summed up in the following list:

- By who was the kiosk used, e.g. what age groups and gender groups?
- How many participants were present at a specific time?
- How long did they stay?
- Was there any evidence of a pecking order?
- What were the spectators' reactions?
- No sound, keystrokes or screenshots were recorded. Was there evidence of learning taking place?

With these issues in mind, I observed and recorded the videos. I made field notes of the first six weeks, starting at December 6, 2003. (These notes can be seen in Addendum 2). A summary of each week's observation, in accordance with the above-mentioned points, is given in table form in Section III.

9 Presentation of the Essay

This paper reports on the observations of the Digital Doorway project, set up by the CSIR, in Mamelodi. This dissertation is the result of the research and is done in three sections:

- An introduction where all the background is provided and explained.
- A stand-alone article that can be submitted for publication.
- Conclusions that contain a summary of the observations as well as recommendations for further study.

Chapter II: Article

An Initial Investigation to

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1 Abstract

Demands on education call for a new paradigm, which goes beyond traditional practice. It includes communication skills, the ability to find information, as well as the ability to interact with others (Sampson et al, 2002). These demands require creative and critical thinking to make provision for the explosion of information technology in a world that contains a large population of people without the means to obtain the necessary skills.

The Council for Science and Industrial Research (CSIR) placed an unsupervised computer in Mamelodi, a town in South Africa. This project was called Digital Doorway, meant to provide a doorway to the digital world. The setting in Mamelodi is different from other related projects, because it is not a rural township and computers are available to some people.

Children are growing up in an increasingly digital environment and the country cannot afford that some do not have the opportunity to access the digital environment. Outcome Based Education is part of our education system, but the likelihood of success may be small unless the learners are computer literate and have access to the Internet. In these Digital Doorway projects people obtain access to computing, including the Internet, in an unstructured setting.

This paper reports on the initial investigation of the Digital Doorway project in Mamelodi and it determines in which areas further research should be done. The socialising of the participants and spectators with each other and their interaction with the computer is described. This research was conducted to assess and map the first six weeks of this experiment.

2 Introduction

A computer, without any supervision, was placed in Mamelodi . This experiment were meant to bridge the digital division and were called "Digital Doorway". The project was launched to bring technology to people who cannot afford it or do not have access to it. The computer was connected to the Internet. This experiment was a result of the work started in India by Mitra, as well as in Cwili in South Africa. In India, the name "Hole in the Wall" was given to this project because the computer was placed in a wall. One of the consequences of these experiments was that the term "Minimally Invasive Education", originating from the medical term "Minimally Invasive Surgery", crystallised. It was found that, without any direct input, curiosity led children to explore on computers, which resulted in constructive learning. Children intuitively worked together in co-operative groups (Mitra, 2002).

The following key issues were identified for the course of this research after some parts of the video material had been screened:

- Is it worthwhile for the CSIR to construct such sites and maintain the expensive computer equipment?
- Does the physical framework of the kiosk allow room for spectators? Could the participants and the spectators see the computer screen?
- The use of the facilities by the participants, including their interaction with the computer and each other, should be observed.
- What time of the day was the facility used?
- Was there evidence of learning taking place?

- The participants:
  - What gender and age were they?
  - For how long did they stay?
  - To what extent did spectators participate?
  - Were there signs of a pecking order?

After these issues had been identified, the research questions were formulated.

3 Research Question

The main purpose of this research was to do an initial investigation of the voluntary and unstructured activities in the computer kiosk. This kiosk was erected to open a digital doorway to computing. The following key issues were investigated:

> ***Describe the observations when viewing the video material.***
>
> ***Describe the activities and the tendencies of the participants in the setting.***
>
> ***Describe the interactions of the participants and the spectators with each other and with the computer.***
>
> ***Explore and map the events at the computer kiosk in Mamelodi.***

4 Limitations of this Study

The following restrictions applied at the time of this study:

- No screen captures were made
- It was not possible to see on the videos which program was used on the computer.
- There were no keystrokes captured, with the result that the observer did not know what was happening on the computer.
- The sounds in the kiosk were barely audible.
- The language spoken was not English, but mainly Sotho and Zulu.

The site was never visited to question the participants. Visiting the site would be included in the recommendations for further study.

5 Literature Review

The purpose of this study was to describe the initial stages of the Mamelodi Digital Doorway. This purpose included the observation and assessment of the events in the computer kiosk covering a period of six weeks.

5.1 Constructivism

According to Bencze (2002), constructivism emphasizes the building or construction that occurs in people's minds when they learn. Learning is therefore an active and not a passive process. Our sense organs send information to our brains and we construct a unique mental image by combining this information. The potential learning obtained by using these kiosks is probably constructive, because children were involved in an active process where they developed skills through play.

A major theme in Bruner's constructivist framework is that learning is an active process. Learners will construct new concepts based upon their current or past knowledge. Bruner (1973) states that a learner can select and transform information, construct hypotheses and make decisions relying on a cognitive structure to do so.

Jonassen (2003) states that technologies should be used to keep students active and constructive. Learning environments ought also to include linked qualities such as collaborative, intentional, complex, contextual, conversational and reflective aspects, as illustrated in Figure 8.

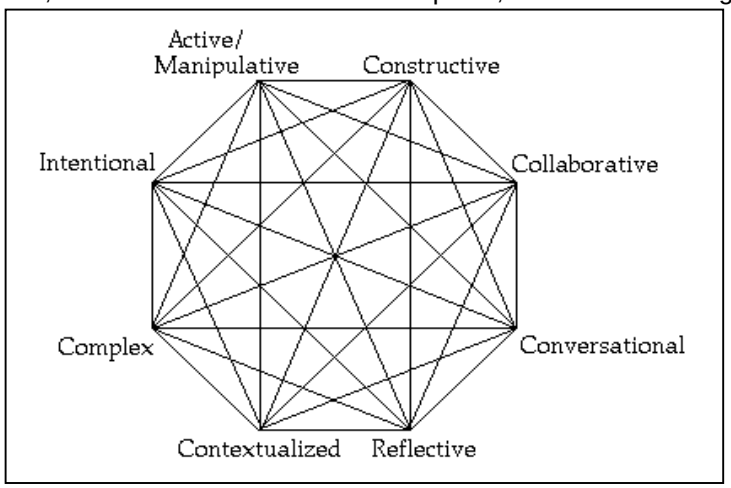

Figure 8: Learning Environment Qualities (Jonassen, 2003)

Learners of all ages can acquire highly developed skills and complex knowledge without intervention. Through play learners can develop skills and knowledge that they often share with other members of the community (Herron, 1971). They actively manipulate objects by reflecting on what they have done.

Constructivist learning emphasizes active learning over direct instruction (De Villiers, 2002). Key characteristics, such as active participation by the learner and real-world context, are fundamental to constructivism. One of the main reasons for the necessity of these characteristics is the required adaptability and flexibility, a result of the rapid change that had been a feature since the late twentieth century. Some researchers believe that constructivism and objectivism are opposing paradigms. Cronjé (2004) plots the two views at right angles to each other and creates four quadrants with various degrees of integration with one another, showing that objectivism and constructivism are approaches that compliment each other.

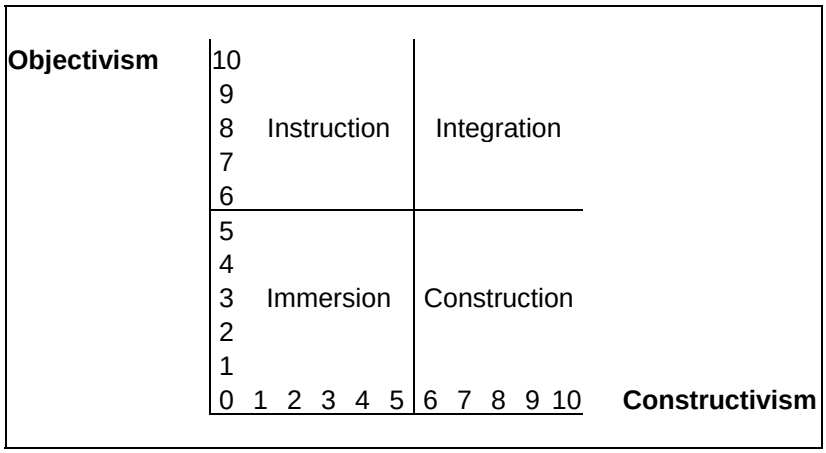

Figure 9: Four quadrants of teaching and learning (Cronjé, 2004)

In the immersion quadrant, learning is not determined by an outside entity, but the experiences are opportunistic. It may seem as if no learning is taking place, but Cronjé (2004) compares this learning with an example of a baby saying a first word. Most learning may be taking place in this way.

5.2 Co-operative and Collaborative Learning

Co-operative learning takes place with active participation of the learners with each other. They jointly seek the solution of a problem (Rysavy et al, 1991).

This learning system became a standard practice in the 1990s. It can be defined as a set of processes whereby people work together to accomplish a specific goal (De Villiers, 2002). It can also be described as a philosophy of learning, rather than a classroom technique. Active participation by learners is emphasized. Learners will jointly seek to clarify or justify their beliefs. In an educational setting, they will collaborate to pass on valuable life-skills that prepare them for the workplace.

Co-operative learning can be seen as a sense of sink or swim together. In this relationship a group of students will require a clear-cut interdependence and interpersonal skills, such as communication, conflict resolution and leadership (Rodger et al, 1994).

5.3 Minimally Invasive Education

In Minimally Invasive Education (MIE) curiosity, without any help from educators, leads children to explore with resulted learning (Mitra, 2002).

> **Definition**
> *Minimally Invasive Education (MIE) derives its name partly from the medical term minimally invasive surgery. MIE is a pedagogic method where mere curiosity, without any direct input from educators, leads children to explore with resulted learning. The children relate their new experience with their previous experience, as they explore their environment, and thereby new learning takes place. Hence, 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. Computers and the Internet have a great deal of material that can stimulate curiosity and learning among various age groups of children* (retrieved from the internet at http://www.niitholeinthewall.com/mie/htm).

The experiments in India showed that the acquisition of basic computing skills by groups of children could be achieved through incidental learning and some minimal guidance (Mitra, 2000). According to Mitra (2000) almost all teaching-learning interactions can be classified as one of the following:

- Those where the teacher or external resource determines the learning content and methodology.
- Those where the teacher or external resource determines the learning, in consultation with the learners.
- Those where the learners determine their own learning outcomes and how they will go about it.

The last of these encompasses theories situated in cognition and constructivism, where children actively construct their own knowledge. In the context of co-operative learning and constructivism networked computing environments become important. There are many academicians who believe that the ability to access the Internet, and the quality of training provided, are the key elements in

Internet usage. Mitra (2002) believes that this is not the case. He reported the results of experiments in Internet and computer usage using a “minimally invasive” approach to learning in India.

5.4 Future Learning

According to Tapscott (2003), the youth is growing up digitally in this information era, a fact which future teaching and learning will have to take into consideration. Some young people think that their future cannot be trusted to anyone else, no government or corporation can ensure their uncertain future. They are open minded and have a desire to be connected to friends, family and even online virtual communities (Tapscott, 2003).

Table 3 lists, according to Reigeluth (1996), some of the "key markers" that should distinguish the new (information-age) paradigm of instructional theories from the old (industrial-age) paradigm.

Table 3 Reigeluth's "Key Markers" (Reigeluth, 1996)

INDUSTRIAN AGE		INFORMATION AGE
Standardization	.....	Customization
Centralized control	.....	Autonomy with accountability
Adversarial relationships	.....	Cooperative relationships
Autocratic decision making	.....	Shared decision making
Compliance	.....	Initiative
Conformity	.....	Diversity
One-way communications	.....	Networking
Compartmentalization	.....	Holism
Parts-oriented	.....	Process-oriented
Teacher as "King"	.....	Learner (customer) as "King"

As the culture of the upcoming generation is imported into society, every institution will have to change. The very concept of education will change. Governments will also have to become more open, as the old hierarchal bureaucracies are irrelevant to the new generation (Reigeluth, 1996).

The ability to access the Internet is an important factor in learning. In his book, *Growing Up Digital*, Brown (2002) compares the Internet with the invention of electricity, stating that the web is "*as fundamental to society as electrification*". Literacy is not any more only the reading of text, but it also involves image and screen literacy. Information navigation is a crucial part of this literacy. With the incredible amount of information available on the Internet, a new way of learning becomes evident. It is learning by "discovery" rather than learning by "lecture". This learning has to do with the ability to find something, and then use it as an object or a tool to build something. The young generation does not want to learn how things work before using them. They want to turn things on and see what works. They watch what other people are doing and try it out themselves. Learning becomes situated in action (Sampson et al, 2002).

The World Wide Web may become the teaching and learning tool of the future. It is a two-way proposition where a user can be a receiver as well as a sender. The Internet honours multiple forms of intelligence: textual, abstract, visual, musical and social. In this context, it is very important that our young people should have access to computers that are linked with the World Wide Web (McKenzie, 1998).

5.5 Observation

According to Fox (1998), observational studies allow the researcher to see first-hand what is happening, rather than depending on respondents. Although observation includes all our senses, sight and sound will be predominant in most research. When a researcher observes, data can be organised to make sense out of it.

Observation can range from becoming a complete participant to a complete observer. Before any observational research can start, certain decisions must be taken:

- When will the observations be made?
- How often will it be done?
- How long should one observe?
- Most important, what must be observed?

Reliability and validity constitute a reflection of the trustworthiness of the world explored in observation. The researcher must be concerned with the accuracy of description in qualitative research. Conformability or objectivity must be minimised (Boeree, 2003). The researcher should not have built-in biases.

With observational research people are watched in their natural environment. Video tapes and cameras can be used to record the data enabling the researcher to gather any amount of documented observations. Attention can thus be paid to minute details that can often be overlooked. One of the pros is that results are supported by verifiable evidence. The research will be done in context and the results are not defined by the design of the method (Nicholas et al, n.d.).

6 Methodology

The primary method of data collection was the observation of the participants at the computer in the kiosk. A concealed video camera captured this data. These videos were stored on the file server at the CSIR. The videos were available in MPEG format on electronic devices. They were then observed on a computer.

6.1 Participants

This study was an initial inquiry where data was collected by observing the participants and the spectators in the computer kiosk. In this study, group and individual interactions and behaviour were recorded. The participants were the people, mainly children, who visited the kiosk.

6.2 Procedures

Observational research, where the concern is not necessarily a right or wrong answer, was used. The advantage of this technique is that the behaviour of the participants can be observed directly, rather than self-reported behaviour (Fox, 1998). In qualitative observational research the essential model must be determined. This data collection technique can implicate building on an earlier study.

With this method first-hand data is gathered on the processes and behaviour being studied. By observing operations and activities a holistic perspective, i.e. an understanding of the context within which the project operates, can be reached (Fox, 1998). Observation may be especially important where it is not the event that is of interest, but rather how that event may fit into, or be impacted by a sequence of events. Validity is enhanced by the fact that the data is recorded. Whenever there is doubt about an event, it can be observed again

The Investigator used qualitative observation to determine the effectiveness of this kiosk. This research was an initial investigational study that could be valuable for other researchers in further studies. Suggestions for components of this project that can be used for further research are given.

The video recordings that were observed started immediately after the kiosk had been erected on December 6, 2003. A video usually covered a period of one hour. The time frame for the observation was limited to the time between 10h00 and 16h00, because few people visited the kiosk at other times. It was stored under a name consisting of the date as well as the time of the recording.

7 Findings

Viewing and scrutiny of the video material led to the following conclusions to the previously mentioned questions.

7.1 Research Question 1

Describe the observations when viewing the video material.

In order to structure the observations, the elements to record were selected as shown in Table 4. The observations of the video material are summarized in Tables 5 to 10.

Table 4 The points selected to record when observing the video

Physical framework	• could the participants see the screen? • could the spectators see the screen? • was there room for spectators?
Who were the participants?	• what were their age groups? • what was their gender?
The groups	• how large were the group sizes? • how long did they stay? • how often did they use the kiosk? • were there signs of a pecking order?
Spectators	• how did they behave and participate? • did they learn to use the computer?

Table 5 Week 1: 2003-12-06 – 2003-12-12

General	The computer in the kiosk was new and the people did not know what its purpose was.
Rate of use	The use of the facility was rare and the kiosk was empty for long periods.
Age and Gender	Initially adults passing by used it. Teenagers started to discover it later on. There was one woman and then a girl during this week.
Group Sizes	Groups consisted of one to four people.
Duration of stay	Participants stayed for one to ten minutes.
Pecking Order	No signs of a pecking order could be seen at his stage.
Spectators' reaction	The spectators were passive.
Evidence of learning	Some evidence where children showed another what to do. Two children helped an adult.

Table 6 Week 2: 2003-12-13 – 2003-12-19

General	More children were using the computer. The fact that some of them had previously used a computer made them the "leaders". They were not necessarily the biggest or strongest, but they knew the most. In this milieu the "know how" kids were in control.
Rate of use	The kiosk was empty only for short periods.
Age and Gender	Smaller children were the most common participants during this week. Two women and a girl used the computer.
Group sizes	The groups were larger. Group size varied between one and six members.
Duration of stay	The groups stayed between five and thirty minutes.
Pecking Order	No signs of a pecking order
Spectators' reaction	Some of the spectators learned how to use the computer in one of two ways: ▸ either the "know how" kids helped and taught them (peer learning) ▸ or they observed and when they were alone, tried to do the same (MIE).
Evidence of learning	At this early stage it could be seen that Digital Doorway was an instrument for MIE. People, especially children, were learning with minimal help from the outside. Co-operative learning took place most of the time.

Table 7 Week 3: 2003-12-20 – 2003-12-26

General	When children occupied the kiosk, they were more excited and noisy. Their groups were generally larger than the teenager groups and they would squeeze for a place in the front.
Rate of use	The computer was used frequently.
Age and Gender	The groups consisted mostly of teenagers, with a few younger children.
Group sizes	Large groups of up to ten children.
Duration of stay	Groups would stay for as long as two hours.
Pecking Order	If the group were mixed, the teenagers would take over and run the show. The children would observe from a distance. A pecking order was definitely part of this framework: whenever younger children were in front of the computer and older teenagers entered, the children would give way to the older (bigger) ones.
Spectators' reaction	Spectators were very enthusiastic, especially the younger children. When older children used the computer, the smaller children were sometimes obviously bored, but stayed on, presumably hoping for a chance in front of the computer.
Evidence of learning	Learning was still taking place. The children who were not sure of themselves would watch all the time. When the group split up and left, such a child would try to press keys on the computer. Sometimes the child would leave and return when the kiosk was empty.

Table 8 Week 4: 2003-12-27 – 2004-01-02

General	This week started with two days in which the kiosk was filled with children and teenagers using the computer. Then it emptied for the rest of the week.
Rate of use	Something happened. The kiosk was seldom occupied during this week.
Age and Gender	Boys were the only users.
Group sizes	No groups were formed during this week.
Duration of stay	Users stayed for one or two minutes.
Pecking Order	There were traces of a definite pecking order: the moment that teenagers entered the kiosk, the children either would leave or stand at a distance.
Spectators' reaction	There were no spectators during this week.
Evidence of learning	No learning was taking place.

Table 9 Week 5: 2004-01-03 – 2004-01-09

General	The number of participants increased dramatically during this week
Rate of use	The kiosk was filled again for most of the time.
Age and Gender	The most common participants during this week were teenagers. Adults seldom used it. Children used it if there were no teenagers. By the end of the week, a woman and two girls had used it.
Group sizes	Groups of six to twelve participants were simultaneously in the kiosk.
Duration of stay	The groups stayed for up to two hours. They would leave, and then some returned and stayed again for up to two hours.
Pecking Order	A definite pecking order could be seen: teenagers would replace children using the kiosk. The moment that a group of teenagers entered, the children left.
Spectators' reaction	The spectators were very enthusiastic. They pushed to get in front and to see the screen.
Evidence of learning	The “know-hows” were still the leaders and showed the others what to do.

Table 10 Week 6: 2004-01-10 – 2004-01-16

General	After schools had opened, the children were not seen in the kiosk in the mornings.
Rate of use	The kiosk was mostly empty during the mornings, but in the afternoon and over weekends it was filled as usual.
Age and Gender	During the afternoons, mostly teenagers visited the kiosk. Adults occupied it in the morning, something that had not happened earlier.
Group sizes	The group sizes were smaller during the week. One to six people used the kiosk at the same time.
Duration of stay	The groups stayed long, up to three hours.
Pecking Order	The pecking order seemed to be: *Teenagers, then children, then adults and last of all women.*
Spectators' reaction	The spectators were still very enthusiastic.
Evidence of learning	All the people using the kiosk seemed much more confidant. They had learned, either by themselves or through peer learning, how to use the computer.

The main observation when viewing the video material was a group of excited children, squeezing against each other, in front of the computer. This group consisted most frequently of young children and teenagers. Adults used the kiosk rarely, mostly early in the mornings or late in the afternoons.

Children were usually in groups of four to ten. A group would often stay for more than an hour. One or two of them generally pressed the keys while the others watched. The spectators squeezed against each other to get a better view of the screen. The participants' ages varied between eight and eighteen. There were a few younger children (younger than eight years) who used the computer, but they did not often get a chance. Girls were seldom seen in the kiosk.

7.2 Research Question 2

Describe the activities and the tendencies of the participants in the setting.

The participants were initially cautious about the settings. They seemed to be hesitant of what to expect. The participants would enter the kiosk, press a few keys on the keyboard and leave soon after. They only stayed for short periods of time during the first week (See Tables 5 – 10).

As the participants grew accustomed to the settings, they became more spontaneous. They stayed for longer periods, and they seemed more confident of what they were doing.

The most frequent users were teenage boys. Children in their pre-teens visited the kiosk in larger groups. Women seldom visited the kiosk. This absence of women is a distressing observation, as the Minister of Science and Technology, Mosibudi Mangena, encourages girls to become more involved in the natural sciences (Matomela, N). The reason for the absence of girls should be explored.

The CSIR discovered that the children visited pornographic sites on the Internet. They decided to place a firewall on the Internet usage. With this restriction the people using the computer and visiting the World Wide Web could only visit South African sites. It is debatable if the CSIR has an ethical obligation to hinder children from visiting pornographic sites.

7.3 Research Question 3

Describe the interactions of the participants and the spectators with each other and with the computer.

Initially there were only a few people visiting the kiosk. However, during the second week word must have spread. The participants and spectators became very enthusiastic about the events in the kiosk.

Adult participants were usually unaccompanied by any spectators.

Teenagers were in groups of one to eight. The spectators were very interested in the computer, but they were subdued. They often watched intently what was happening, and would try to press some keys themselves once they were alone. The participants seldom taught a spectator how to operate the computer. When younger children were present as spectators with these teenage groups, they would maintain a submissive distance. They often got bored, probably because they could not see the computer screen, and either left or sat down against the wall.

The younger children were the most spontaneous participants. They visited the kiosk in groups of up to twelve children. The spectators in these younger groups were enthusiastically noisy. They constantly discussed the proceedings. They battled for a place in the front to see the screen. They would often show one another what to do and took turns to operate the computer.

The spectators could be classified in three categories:

- The first group stood in front, usually leaning on and over the computer, who were very much part of the event. They discussed proceedings noisily and often cheered. They would often take over from the current participant.

- The second group stood a bit further to the back. They were also very enthusiastic about the ongoing events, but they never participated in operating the computer while the others were present. After the group had left, they might come back on their own and tried to use the computer.

- The third group was not really interested in the computer. They usually stood at the back, got bored quickly and would either leave the kiosk or sit on the floor. Some of this group played with each other or tried to draw attention from the other spectators.

There was clear evidence of a pecking order. Younger children used the computer whenever the kiosk was empty, but promptly left when teenagers entered. It never happened the other way round. There were, however, instances where the younger children were the "know-how-to's" and the older children observed what they were doing.

7.4 Research Question 4

Explore and map the events at the computer kiosk in Mamelodi.

Although this study covered the initial stages of the computer kiosk and lacked some of the necessary information to make a definite conclusion, it was observed that learning definitely occurred. It could, at this early stage, be concluded that Digital Doorway was an instrument for MIE. People, especially children, learned with minimal outside help. This learning was usually co-operative. People, mostly children, had voluntary access to computing. They gain computer literacy without any external intervention.

The venue was a good choice and the kiosk was safe to use. The Mamelodi kiosk computer is situated in a corner of the room limiting room for spectators on the left. It is suggested that the computer should be placed in the centre of a wall to allow space for more spectators. The screen is high enough for adults and low enough for most of the children. The footstool helps the little ones to reach the keyboard.

Although no words could be distinguished, the loud, excited voices of the children were audible. Further study in voice recordings is suggested. In this initial study participants and spectators were not interviewed.

8 Conclusions

Recognition that we live in a rapidly changing economy has led to an increased interest in lifelong learning (Kirby et al, 2002). The capability to continue learning has become more essential than the possession of any particular knowledge. Homer-Dixon (2000) concluded that as the world and our lives become more complicated and faster-paced, we have a need for other ways of learning. These new ways of learning include ways that stress our ability to come up with creative solutions to problems we have never seen before.

Students entering the working community at present face exceptional challenges. In the traditional economy, physical capital and material resources have been the driving force, whereas the new economy is driven by human/intellectual capital and knowledge (Sampson et al, 2002). As computer-based systems tend to take over the linear, repetitive functions that 20th century workers used to perform, the new economy workers are expected to focus on problem-solving and critical thinking tasks (Hartley, 2000).

Seuss (1990) invites us to be open to the potential of the universe through this brilliant phrase:

"*Oh, the places you'll go*!"

The path of e-learning is in some ways very like that journey of exploration. According to Rosenberg (2001), online training is here as a viable mode of instruction. This project provides the opportunity for many people without access to computers and the Internet, to partake in this journey of learning.

From this research it is feasible and needed to erect more sites like Digital Doorway, Mamelodi. Further research should show if learning is taking place. These children, previously without the opportunity, can then be part of the digital community that is evolving. This project can truly open a digital doorway for people who do not have access to computing to become computer literate.

These projects, which promote practical computer literacy, should be expanded. After six weeks, the children used the computer in the kiosk with aplomb. They were very enthusiastic and the kiosk was seldom filled with less than four people.

9 Recommendations for Further Study

The initial mapping of the project made it clear that more research on this project is needed. Due to this initial study, the following recommendations for further study are suggested:

	The computer were kept in good working	Not all spectators could see the screen	Spectators were very enthusiastic	Children showed each other what to do on the	All activities were video taped at all	The groups were growing larger	Children accessed porn sites which the CSIR blocked	Games were played most of	Women seldom used the kiosk	Adults seldom visited the kiosk
It is hypothesized that even in totally unfamiliar situations, children in groups will learn on their own with little or no input from others, provided the learning environment induces an adequate level of curiosity. Is this true?			X	X		X				
If given appropriate access and connectivity, can children learn to operate computers? Can they use the Internet with none or minimal intervention from adults?			X	X		X	X			
What are the issues relating to the absence of girls at the computer kiosk?									X	
What do the children using the kiosk know about computers in comparison with other children who have had formal training?						X	X	X		

	The computer were kept in good working order	Not all spectators could see the screen	Spectators were very enthusiastic	Children showed each other what to do on the computer	All activities were video taped at all times	The groups were growing larger	The children accessed porn sites which the CSIR fire walled	Games were played most of the time	Women seldom used the kiosk	Adults seldom visited the kiosk
Is it possible to install a computer, connect it to the Internet, design it for use by children, and keep it in working condition in any external (outdoor) environment?	X	X								
Are there behavioural changes in the children, in their speech, expression, use of the English language, manners etc.? Can these changes be measured?			X			X				
What are the social issues at hand? Are the children's "free time" patterns changing because of the kiosk? How do the children interact with their peers?						X		X		
Does the CSIR have any ethical obligations to the people using the kiosk, e.g. permission of participants to be observed and photographed?					X					
Is the CSIR obliged to prevent the children from getting into pornographic sites, or should access be totally unrestricted for everybody?							X			
The keystrokes used should be recorded to enable a statistical study that will show what programmes are used more often.					X			X		
Are the programs available at the kiosk all of equal importance to the various user groups?								X	X	X
What are the measures that should be in place for older people in the community to be drawn to the kiosk?										X
What are the layout considerations and specifications for such a computer kiosk in terms of optimal access and usage?		X	X							

The above research will enrich the project and promote the quest for the ability to access computer and Internet usage.

10 References

Balkcom, S. (June 1992). Cooperative learning, Education Research Consumer Guide.

Bencze, J. L. (2002). *Constructivism*. Retrieved on March 10, 2004 at http://www.oise.utoronto.ca/%7Elbencze/Constructivism.html

Boeree, G. C. (2003). *Qualitative Methods: Part Three*. Retrieved on November 24, 2004 at http://www.ship.edu/~cgboeree/qualmeththree.html

Brown, B. L. (2000) *Web-Based Training.* Retrieved on February 2, 2004 at http://www.cete.org/acve/docs/dig218.pdf

Brown, J. S. (2002). *Growing up Digital*. 2004. Retrieved on February 2, 2004 at http://www.aahe.org/change/digital.pdf

Bruner, J. (1973). *Constructivist Theory*. Retrieved on February 2, 2004 at http://tip.psychology.org/bruner.html

Chinneck, J. W. (1999). *How to organize your thesis*. Retrieved online in November 2003 at http://www.sce.carleton.ca/faculty/chinneck/thesis.html

Cronjé, J. (2004). "Paradigms revisited - Towards integrating objectivism and constructivism in instructional design." 21.

Cronjé, J. (n.d). *Education for Technology, Technology for Education.* Retrieved on March 11, 2003 at http://hagar.up.ac.za/catts/abc/Techplan97.html

De Villiers, R. (2002). *Learning Theories* (Doctoral dissertation, University of Pretoria, 2002).

Fox, N. (1998). *How to use observation in a research project*, Trend Focus Group. Retrieved on November 18, 2003 at http://www.trentfocus.org.uk/resources/how%20to%20use%20observations...pdf

Hansen, D. J. (2003). [Review of the book: *E-Learning: Strategies for Delivering Knowledge in the Digital Age*]. (Author: M. Rosenberg). *Educational Technology & Society*, 6(3), 80-81, *Available at* http://ifets.ieee.org/periodical/6_3/11.html

Hanson, J. (2001). [Review of the book *E-Learning: Strategies for Delivering Knowledge in the Digital Age*]. Rosenberg, M. Retrieved online in March 16, 2004 at http://www.mcgraw-hill.com

Herron, R. E. & Sutton-Smith, B (Eds.). (1971). Child's Play. New York: John Wiley and Sons.

Hoepfl, M. C. (1997). Choosing Qualitative Research: A Primer for Technology Education Researchers. Technology Education.

Homer-Dixon, T. (2000). The ingenuity gap. New York: Knopf.

Jonassen, D. (2003). *Welcome to the Design of Constructivist Learning Environments (CLEs)*. Retrieved on February 28, 2004 at http://tiger.coe.missouri.edu/~jonassen/courses/CLE/index.html

Judge, P. (2000). *New Delhi physicist Sugatra Mitra has a radical proposal for bringing his country's next generation into the Info Age.* From a Businessweek Online Daily Briefing, March 2, 2000. Retrieved on December 8, 2003 at http://www.greenstar.org/butterflies/Hole-in-the-Wall.htm

Kapoor, S. & Mitre, S. (n.d.). *Reaching Out To The Other Side.* Retrieved on December 8, 2004 at http://www.asiaweek.com/asiaweek/technology/article/0,8707,171453,00.html

Kilbride, P., Suda, C., Njeru, E. (2001). *Street Children in Kenya*. Obtained on January 19, 2004 at http://www.greenwood.com/books/bookdetail.asp?sku=G862

Kirby, J. R., Knapper, C. K., Maki, S. A., Egnatoff, W. J & Van Melle, E. (2002). *Computers and Students' Conceptions of Learning: The Transition from Post-Secondary Education to the Workplace* http://ifets.ieee.org/periodical/vol_2_2002/kirby.html

Matomela, N. (2004). *Country Faces Challenges in Science, Technology.* Obtained on March 30, 2004 at http://allafrica.com/stories/200406180559.html

McKenzie, J. (1998). *Learning Digitally. Electronic*. Now On The Educational Technology Journal, vol8 no.3. Retrieved March 16,2004 from http://www.fno.org/nov98/digital2.html

McMillan, J. H. & Schumacher, S. (2001). *Research in Education*. Longman: United States.

Mitra, S. (2000). *Minimally Invasive Education for mass computer literacy*. CRIDALA 2000, Hong Kong.

Mitra, S. (2002). *Experiments in Bangalore, Karnataka*. Retrieved on November 10, 2003 at http://niitholeinthewall.com/home

Nicholas, M. & Catherine, P. Qualitative Research: (n.d.). *Observational methods in health care settings.*

OPC, Observational Research Techniques. Retrieved September 27, 2003, from http://www.orientpacific.com

Reigeluth, C. M. (1996). *What Is the New Paradigm of Instructional Theory.* Retrieved on March 11, 2004 at http://it.coe.uga.edu/itforum/paper17/paper17.html

Rodger, T. & David, W.J. (1994). *An Overview Of Cooperative Learning.* Retrieved on February 28, 2004 at http://www.co-operation.org/pages/overviewpaper.html

Roode, J. D. (n.d.). *Implications for Teaching of a Process-Based Research Framework for Information Systems.* Retrieved September 10, 2003, from http://hagar.up.ac.za/catts/mit/research/research.html

Rosenberg, M. (2001). *E-Learning: Strategies for Delivering Knowledge in the Digital Age*. The McGraw Hill Companies.

Russell, D. (2002). "Minimally Invasive Education pilot project: Cwili Village. *Internal Evaluation Report for Period: 1 December 2002 to 28 February 2003."*

Rysavy, S. D. M. & Sales, G. C. (1991). Cooperative Learning in computer-based instruction Educational Technology Research and Development, 39, 70-79.

Sampson, D., Karagiannidis, C., Schenone, A. & Cardinali, F. (2002). *Knowledge-on-Demand in e-Learning and e-Working Settings.* Educational Technology & Society 5 (2) 2002 ISSN 1436-4522 . Retrieved on March 16 2004 at http://ifets.ieee.org/periodical/vol_2_2002/sampson.html

Semmens, C. (2000). *Self-taught computer literacy for kids in Delhi slum.* Retrieved on March 11, 2004 at http://www.globalideasbank.org/inspir/INS-31.HTML

Smith, R., Cambridge, G. & Gush, K. (2003), Curiosity cures the knowledge gap - Cwili township Digital Doorway project: a case study. CSIR.

Seuss (1990). *Oh, the places you'll go!* New York: Random House, Inc.

Tapscott, D. *Growing up digital: The rise of the next generation.* (Various pages used) Retrieved on February 25, 2004 from http://www.growingupdigital.com

Tapscott, D. (2003). *Future Leaders.* Retrieved on February 25, 2004 from http://www.growingupdigital.com

Webb, R. (n.d.). *What do children learn through play?* Retrieved on February 17, 2004 at http://wv.essortment.com/whatdochildren_rgzd.htm

Zielenziger, M. (1995). Logging on in backwater, San Hose Mercury News, Monday, June 12.

Chapter III: Conclusions

Contents

1 Introduction University of Pretoria etd – Grobler, R (2004)

In this initial study the following aspects received special consideration:

- At what rate was the kiosk used?
- By who was it used, e.g. what age groups and gender groups?
- How many participants worked together at a specific time?
- How long was they involved at the kiosk?
- Was there any evidence of a pecking order?
- What were the spectators' reactions?
- No sound, keystrokes or screenshots were recorded. Was there evidence of learning taking place?

The computer in the kiosk was video taped by the CSIR for twenty-four hours a day. This taping started immediately after the kiosk had been erected. These videos were stored on computer in MPEG format. A video usually covered a period of one hour. It was stored under a name consisting of the date as well as the time of the recording. No keystrokes could be recorded and, at the time of this study, no screen captures were made. The sound on the video was mostly inaudible.

The videos were observed and the observations noted (Addendum 2). After each week a summary of the week is given.

The study was conducted by observing the videos on MPEG format on a computer. Because sound could not be distinguished, it did not play any part in the recordings.

2 Observation of Video Material

This study covers the period from 2003-12-08 to 2004-01-16. All graphics used in this dissertation originated from the data provided by the CSIR. The summary of the data of the first six weeks of the Mamelodi Digital Doorway Project is presented in Tables 11 - 16. The detailed description of all the observations is available in Addendum 2. The description of the usage of the computer kiosk tells the story of the mapping of the computer kiosk used by children and adults.

The computer kiosk was seldom used after 18h00. This absence could have been due to the fact that not many people were present in the vicinity after sunset. It could be related to people trying to avoid crime and intimidation after dark. It is also worth mentioning that the computer kiosk was also not well lit.

Unless specifically stated, the participants in the kiosk were usually male. Women and girls were seldom present. When they were, this aspect is mentioned in this text. Also worth mentioning is that no sound, screen captures or keystrokes were available from the available data streams. Such information would have contributed towards the richness this study.

In Tables 11 - 16 each week is summed up according to the questions in the introduction.

Table 11 Week 1: 2003-12-06 – 2003-12-12

General	The computer in the kiosk was new and the people did not know what its purpose was.
Rate of use	The use of the facility was rare and the kiosk was empty for long periods.
Age and Gender	Initially it was the adults passing by who used it. Teenagers started to discover it later on. There was one woman and then a girl during this week.
Group Sizes	Groups consisted of one to four people.
Duration of stay	Participants stayed for one to ten minutes.
Pecking Order	There were no signs of a pecking order at his stage.
Spectators' reaction	The spectators were passive.
Evidence of learning	Some evidence where children showed another what to do. Two children helped an adult.

Figure 10: Children helping an adult

Table 12 Week 2: 2003-12-13 – 2003-12-19

General	More children were using the computer. The fact that some of them had previously used a computer made them the "leaders". They were not necessarily the biggest or strongest, but they knew the most. In this milieu the "know how" kids were in control.
Rate of use	The kiosk was empty only for short periods.
Age and Gender	Smaller children were the most common participants during this week. Two women and a girl used the computer.
Group sizes	The groups were larger. Group size varied between one and six members.
Duration of stay	The groups stayed between five and thirty minutes.
Pecking Order	No signs of a pecking order
Spectators' reaction	Some of the spectators learned how to use the computer, which happened in one of two ways: ▸ either the "know how" kids helped and taught them (peer learning) ▸ or they observed and when they were alone, tried to do the same (MIE).
Evidence of learning	At this early stage, it could be seen that Digital Doorway was an instrument for MIE. People, especially children, who did not have the means, were learning without, or with minimal, help from the outside. Co-operative learning took place most of the time, because some of these children had had experiences with computers.

Figure 11: More children use the computer

Table 13 Week 3: 2003-12-20 – 2003-12-26

General	When children occupied the kiosk, they were more excited and noisy. Their groups were generally larger than the teenager groups and they would squeeze for a place in the front.
Rate of use	The computer was frequently used.
Age and Gender	The groups consisted mostly of teenagers, with a few younger children.
Group sizes	Large groups of up to ten children.
Duration of stay	Groups would stay for as long as two hours.
Pecking Order	If the group were mixed, the teenagers would take over and run the show. Children would observe from a distance. A pecking order was definitely part of this framework: whenever younger children were in front of the computer and older teenagers entered, the children would give way to the older (bigger) ones.
Spectators' reaction	Spectators were very enthusiastic, especially the younger children. When older children used the computer, the smaller children were sometimes obviously bored, but stayed on, presumably hoping for a chance in front of the computer.
Evidence of learning	Learning was still taking place. Children who were not sure of themselves would watch all the time. When the group split up and left, such a child would try to press keys on the computer. Sometimes the child would leave and return when the kiosk was empty.

Figure 12: Two small children using the computer

Table 14 Week 4: 2003-12-27 – 2004-01-02

General	This week started with two days in which the kiosk was filled with children and teenagers using the computer. Then it emptied for the rest of the week.
Rate of use	Something happened. The kiosk was seldom occupied during this week.
Age and Gender	Boys were the only users.
Group sizes	No groups were formed during this week.
Duration of stay	Users stayed for one or two minutes.
Pecking Order	There were traces of a definite pecking order: the moment that teenagers entered the kiosk, the children either would leave or stand at a distance.
Spectators' reaction	There were no spectators during this week.
Evidence of learning	No learning was taking place.

Table 15 Week 5: 2004-01-03 – 2004-01-09

General	The number of participants increased dramatically during this week
Rate of use	The kiosk was filled again for most of the time.
Age and Gender	The most common participants during this week were teenagers. Adults seldom used it. Children used it if there were no teenagers. By the end of the week a woman and two girls had used it.
Group sizes	Groups of six to twelve could be seen.
Duration of stay	The groups stayed for up to two hours. They would leave, and then some would return and stayed again for up to two hours.
Pecking Order	A definite pecking order could be seen: teenagers would replace children using the kiosk. The moment that a group of teenagers entered, the children left.
Spectators' reaction	The spectators were very enthusiastic. They pushed to get in front and to see the screen.
Evidence of learning	The “know-hows” were still the leaders and showed the others what to do.

Figure 13: Spectators watching the "Know-hows"

Table 16 Week 6: 2004-01-10 – 2004-01-16

General	After school had opened, children were not seen in the kiosk in the mornings.
Rate of use	The kiosk was mostly empty during the mornings, but in the afternoon and over weekends, it was filled as usual.
Age and Gender	During the afternoons mostly teenagers visited the kiosk. Adults occupied it in the morning, something that had not happened earlier.
Group sizes	The group sizes were down during the week. One to six people used the kiosk together.
Duration of stay	The groups stayed long, up to three hours.
Pecking Order	The pecking order seemed to be: *Teenagers, then children, then adults and last of all women.*
Spectators' reaction	The spectators were still very enthusiastic.
Evidence of learning	All the people using the kiosk seemed much more confidant. They must have learned, either by themselves or through peer learning, how to use the computer.

Figure 14: Young children gather in front of the computer

The main observation when viewing the video material was a group of excited children, squeezing against each other, in front of the computer. This group consisted most frequently of young children and teenagers. Adults used the kiosk less frequently, often early in the mornings or late in the afternoons.

3 Conclusions University of Pretoria etd – Grobler, R (2004)

It is highly recommended that the CSIR should continue with their project, which promotes practical computer literacy. After six weeks, children used the computer in the kiosk with aplomb. They were very enthusiastic and the kiosk usually contained more than four people.

3.1 Physical Framework

The venue was well chosen and the kiosk was safe to use. A few changes in the kiosk are suggested:

- The computer was placed in a corner of the kiosk. This location prevented spectators from standing to the left of the screen. They had to stand behind or on the right hand side of the computer.
- If a few taller children or adults were in front, the little ones could not see the screen and they got bored. A few more footstools could solve this problem.

There may be a logistic reason why so few girls used the kiosk. This absence of women should be investigated.

3.2 The Participants

When observing the video material, the first impression of the participants was an excited group of children in front of the computer. The following issues were noted about the participants:

- The most common participants were children.
- Adults used it more often early in the mornings or late in the afternoons.
- Children were mostly in groups of four to twelve.
- A group would often stay for more than an hour.
- Generally, one or two of them pressed the keys while the others watched.
- The participants' ages varied between six and eighteen. A few younger children used the computer in the kiosk, but they did not often get a chance.
- Girls were seldom seen in the kiosk. This absence of women is a distressing observation, as the education department encourages girls to become more involved in the natural sciences.

Figures 10 to 14 are included to show the participants and spectators in front of the computer.

3.3 The Spectators

The spectators squeezed against each other to get a better view of the screen. They could be grouped in three categories:

- Those that stood in front, usually leaning on and over the computer, who were very much part of the event. They would cheer when things happened on the screen. They would be the ones to take over the moment that the participant stopped operating the computer.
- Those that stood a bit further to the back. They were also very enthusiastic about the ongoing events, but they were only observers. When the group had left the kiosk, they might return alone and try to use the computer. Sometimes the security guards would come in and help them.
- Those that was not interested in the computer. They usually stood in the back, got bored soon and would either leave the kiosk or sit on the floor in a corner. Some of the children would play with one another or try to get attention from some of the others.

The younger spectators were enthusiastically noisy. They constantly discussed what was happening on the computer screen. The older spectators were more reserved, but still very interested in the computer.

3.4 Pecking Order

There was without doubt evidence of a pecking order:

- If older teenagers used the kiosk and younger children came in, the younger children would leave immediately.
- If younger children used the kiosk and older teenagers entered, younger children would leave.

It never happened that adults caused children to leave.

A pecking order is part of most children's existence and it was interesting to see that this occurred in the kiosk as well. There were, however, instances where the smaller children were the "know-how's" and the older children observed what these children were doing.

3.5 Learning

Although this study was done in the initial stages of the kiosk and without the necessary information to make a definite conclusion, it was observed that learning took place. It could, at this early stage, be seen that Digital Doorway is an instrument for MIE. People, especially children, learned with minimal help from the outside. Co-operative learning took place most of the time. The participants, especially children, had voluntary and instructional access to computing and they became computer literate without any intervention from outside.

4 Recommendations for Further Studies

From this initial mapping of the project, it became apparent that more research on this project is needed. Categories that warrant further investigation are:

Learning Process and Outcome

A project like this evidently aims to provide and assess a tool for learning. A study on the level and extend of knowledge attained by these informal learning groups, in comparison with groups who had formal training, may provide useful results. It is hypothesized that, even in unfamiliar situations, children in groups will learn with little or no input from others, provided that the learning environment induces an adequate level of curiosity. If given appropriate access and connectivity, can children using these kiosks, with none or minimal intervention from adults, learn to operate computers?

Social and Moral Issues

The children's "free time" patterns probably change because of the kiosk. Does this reduce inactivity and time spent on undesirable activities? How do children interact with their peers? Are there measurable behavioural changes in children in their speech, expression, use of the English language, manners etc.?

What are the issues relating to the absence of women at the computer kiosk?

What measures should be in place in order to encourage older people in the community to use the kiosk?

Does such a project oblige the CSIR with any ethical obligations to the people using the kiosk, e.g. permission of participants to be observed and photographed? Should the CSIR prevent children from getting into pornographic sites, or should access be totally unrestricted?

Feasibility and Technical Issues

Is it possible to install a computer, connect it to the Internet, design it for use by children, and keep it in working condition in any external (outdoor) environment? What are the layout considerations and specifications for such a computer kiosk in terms of optimal access and usage?

Are the programs available at the kiosk all of equal importance to the various user groups? Keystrokes used should be recorded to enable a statistical study that will show which programs are used more often.

The above research will enrich the project and promote the quest for the ability to access computer and Internet usage.

5 References

Africa on the Internet: Starting Points for Policy Information. (1996). *Background Paper Section last updated November 3, 1997.* Retrieved on November 16, 2003 at *http://www.africaaction.org/bp/inet5.html*

Balkcom, S. (June 1992). Cooperative learning, Education Research Consumer Guide.

Bencze, J. L. (2002). *Constructivism*. Retrieved on March 10, 2004 at http://www.oise.utoronto.ca/%7Elbencze/Constructivism.html

Boeree, G. C. (2003). *Qualitative Methods: Part Three*. Retrieved on November 24, 2004 at http://www.ship.edu/~cgboeree/qualmeththree.html

Brown, B. L. (2000) *Web-Based Training.* Retrieved on February 2, 2004 at http://www.cete.org/acve/docs/dig218.pdf

Brown, J. S. (2002). *Growing up Digital*. 2004. Retrieved on February 2, 2004 at http://www.aahe.org/change/digital.pdf

Bruner, J. (1973). *Constructivist Theory*. Retrieved on February 2, 2004 at http://tip.psychology.org/bruner.html

Chinneck, J. W. (1999). *How to organize your thesis*. Retrieved online in November 2003 at http://www.sce.carleton.ca/faculty/chinneck/thesis.html

Cronjé, J. (2004). "Paradigms revisited - Towards integrating objectivism and constructivism in instructional design." 21.

Cronjé, J. (n.d). *Education for Technology, Technology for Education.* Retrieved on March 11, 2003 at http://hagar.up.ac.za/catts/abc/Techplan97.html

De Villiers, R. (2002). *Learning Theories* (Doctoral dissertation, University of Pretoria, 2002).

Fox, N. (1998). *How to use observation in a research project*, Trend Focus Group. Retrieved on November 18, 2003 at http://www.trentfocus.org.uk/resources/how%20to%20use%20observations...pdf

Hansen, D. J. (2003). [Review of the book: *E-Learning: Strategies for Delivering Knowledge in the Digital Age*]. (Author: M. Rosenberg). *Educational Technology & Society*, 6(3), 80-81, *Available at* http://ifets.ieee.org/periodical/6_3/11.html

Hanson, J. (2001). [Review of the book *E-Learning: Strategies for Delivering Knowledge in the Digital Age*]. Rosenberg, M. Retrieved online in March 16, 2004 at http://www.mcgraw-hill.com

Herron, R. E. & Sutton-Smith, B (Eds.). (1971). Child's Play. New York: John Wiley and Sons.

Hoepfl, M. C. (1997). Choosing Qualitative Research: A Primer for Technology Education Researchers. Technology Education.

Homer-Dixon, T. (2000). The ingenuity gap. New York: Knopf.

Jonassen, D. (2003). *Welcome to the Design of Constructivist Learning Environments (CLEs)*. Retrieved on February 28, 2004 at http://tiger.coe.missouri.edu/~jonassen/courses/CLE/index.html

Judge, P. (2000). *New Delhi physicist Sugatra Mitra has a radical proposal for bringing his country's next generation into the Info Age.* From a Businessweek Online Daily Briefing, March 2, 2000. Retrieved on December 8, 2003 at http://www.greenstar.org/butterflies/Hole-in-the-Wall.htm

Kapoor, S. & Mitre, S. (n.d.). *Reaching Out To The Other Side.* Retrieved on December 8, 2004 at http://www.asiaweek.com/asiaweek/technology/article/0,8707,171453,00.html

Kilbride, P., Suda, C., Njeru, E. (2001). *Street Children in Kenya*. Obtained on January 19, 2004 at http://www.greenwood.com/books/bookdetail.asp?sku=G862

Kirby, J. R., Knapper, C. K., Maki, S. A., Egnatoff, W. J & Van Melle, E. (2002). *Computers and Students' Conceptions of Learning: The Transition from Post-Secondary Education to the Workplace* http://ifets.ieee.org/periodical/vol_2_2002/kirby.html

McKenzie, J. (1998). *Learning Digitally. Electronic*. Now On The Educational Technology Journal, vol8 no.3. Retrieved March 16,2004 from http://www.fno.org/nov98/digital2.html

McMillan, J. H. & Schumacher, S. (2001). *Research in Education*. Longman: United States.

Mitra, S. (2000). *Minimally Invasive Education for mass computer literacy*. CRIDALA 2000, Hong Kong.

Mitra, S. (2002). *Experiments in Bangalore, Karnataka*. Retrieved on November 10, 2003 at http://niitholeinthewall.com/home

Nicholas, M. & Catherine, P. Qualitative Research: (n.d.). *Observational methods in health care settings.*

OPC, Observational Research Techniques. Retrieved September 27, 2003, from http://www.orientpacific.com

Reigeluth, C. M. (1996). *What Is the New Paradigm of Instructional Theory.* Retrieved on March 11, 2004 at http://it.coe.uga.edu/itforum/paper17/paper17.html

Rodger, T. & David, W.J. (1994). *An Overview Of Cooperative Learning.* Retrieved on February 28, 2004 at http://www.co-operation.org/pages/overviewpaper.html

Roode, J. D. (n.d.). *Implications for Teaching of a Process-Based Research Framework for Information Systems.* Retrieved September 10, 2003, from http://hagar.up.ac.za/catts/mit/research/research.html

Rosenberg, M. (2001). *E-Learning: Strategies for Delivering Knowledge in the Digital Age*. The McGraw Hill Companies.

Russell, D. (2002). "Minimally Invasive Education pilot project: Cwili Village. *Internal Evaluation Report for Period: 1 December 2002 to 28 February 2003."*

Rysavy, S. D. M. & Sales, G. C. (1991). Cooperative Learning in computer-based instruction Educational Technology Research and Development, 39, 70-79.

Sampson, D., Karagiannidis, C., Schenone, A. & Cardinali, F. (2002). *Knowledge-on-Demand in e-Learning and e-Working Settings.* Educational Technology & Society 5 (2) 2002 ISSN 1436-4522 . Retrieved on March 16 2004 at http://ifets.ieee.org/periodical/vol_2_2002/sampson.html

Semmens, C. (2000). *Self-taught computer literacy for kids in Delhi slum.* Retrieved on March 11, 2004 at http://www.globalideasbank.org/inspir/INS-31.HTML

Smith, R., Cambridge, G. & Gush, K. (2003), Curiosity cures the knowledge gap - Cwili township Digital Doorway project: a case study. CSIR.

Seuss (1990). *Oh, the places you'll go!* New York: Random House, Inc.

Tapscott, D. *Growing up digital: The rise of the next generation.* (Various pages used) Retrieved on February 25, 2004 from http://www.growingupdigital.com

Tapscott, D. (2003). *Future Leaders.* Retrieved on February 25, 2004 from http://www.growingupdigital.com

Vithal, R. and Jansen, J. (2002). *Designing your first research proposal: A manual for Researchers in Education and the social sciences.* Lansdowne:Juta and Co.Ltd. Development gateway. E-Learning. Retrieved March 16 2004 from http://www.developmentgateway.org/node/130682/?

Webb, R. (n.d.). *What do children learn through play?* Retrieved on February 17, 2004 at http://wv.essortment.com/whatdochildren_rgzd.htm

Zielenziger, M. (1995). Logging on in backwater, San Hose Mercury News, Monday, June 12.

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Computer Specifications as obtained from the CSIR.

Server Specifications

The server (located inside the custom Digital Doorway housing) consists of the following:

- Intel Celeron 1800Mhz CPU;
- Motherboard (with PCI slot support);
- Onboard sound, VGA and LAN;
- 256MB RAM;
- 1.44 FDD;
- 80Gig 7200 rpm Hard Drive, and
- CD-Writer.

Client Side System Specifications

Client PC

The client PC (located inside the custom Digital Doorway housing) consists of the following:

- Intel Celeron 1700Mhz CPU;
- Motherboard;
- Onboard sound, VGA and LAN
- 128MB RAM
- 1.44 FDD;
- 20Gig 7200 rpm Hard Drive, and
- CD-Rom Drive

Peripheral Equipment

The following peripheral equipment has also been installed and associated with the Client PC:

- 15"inch LCD Monitor;
- KG0209 Vandal resistant keyboard with touch pad;
- Speakers, and
- PC USB Web Cam.

Digital Doorway Housing

The Digital Doorway Housing consists of the following:

- Customized robust powder-coated steel free standing enclosure;
- Security key switches (located underneath the keyboard) for resetting the Client PC;
- Extraction fan;
- Base Plate (bolted to the floor using 5 M10 Rawl bolts);
- Back plate;
- Front plate;
- Foot Stand (chained to the base of the Digital Doorway;
- A customized locking mechanism for the front plate, and
- A web cam housing.
- Both server and client PCs reside inside a custom designed steel housing supplied by a Durban company called Online Access.

Security

Additional equipment that has been installed includes:

- Eagle Technologies PCI Colour Frame grabber;
- Eagle E-592 Colour Dome Camera;
- Regulated power supply for camera, and
- A 600VA UPS to clean up the mains supply.

All video and sound is stored on a local server and accessible either as live image or live video. The Digital Doorway website was enhanced to provide live streaming of the images from the security camera, refreshed every 5 seconds.

1.1 Connectivity

The client PC and Server are both connected to a Soekris box (Wireless router) via crossover LAN cables. The Soekris box relays the data via an 802.11 link to a repeater on the CSIR campus. The repeater relays the data back to a server within ***i***comtek (via 802.11), from where the video and sound from the site can be accessed.

The 802.11 repeater equipment has been installed on the mast inside a custom built weatherproof housing.

1.2 Software

The Mamelodi Digital Doorway unit is a fully OPEN SOURCE system. The following software configuration has been implemented:

- **Server**
  - Operating System: FreeBSD version 4.8;
  - Server Software: Apache, and
  - Video capture and streaming software: FFMpeg.
- **Client PC**
  - Operating System: Debian Linux;
  - Windows manager: KDE ver. 3.1;
  - Office Suite: K-Office;
  - Education Pack: K-EDU;
  - Other Software;
  - Mysql database server;
  - Java VM;
  - Eclipse Java development environment;
  - Storymaker story authoring tool;
  - Gcompris Education Suite;
  - GQCam webcam software;
  - Maths, Science, Solar System programs;
  - Puzzles and educational games, and
  - Mozilla Internet Browser.

A start-up page with links to various applications, PDF documents and Internet sites was added to the system. The web page was translated into Setswana and Zulu.

A strong factor influencing the choice of the KDE windows manager was the availability of language modules for a number of the African languages for KDE. African language versions of Mozilla were also installed.

The multilingual HLT application known as Storymaker (being created by ***i***comtek) was developed using the Java programming language (to make it platform independent). An early version of this application was transferred to the client PC of the Digital Doorway.

Addendum 2

Detailed Description of the Observations

The First Week: 2003-12-06 – 2003-12-12

Day 1: 2003-12-06, the first day

At 10h35 two adult women and one adult male entered. The man stood in front of the computer, while the women kept a safe distance. They (the women) left after a few minutes. Two young men entered. They looked around in the kiosk and left shortly after.

At 13h16, a group consisting of one adult and three children arrived. The security guard entered with them. He was obviously familiar with the equipment. The children were onlookers at this stage, clearly not sure, if they may touch or not.

At 13h25 four adult males entered. One immediately started to press keys, knowing what he was doing, while the other three were spectators. One of them was watching closely, while the other two were a bit further away. At a certain stage, a security guard also came to watch. After a while, the active adult and one of the others left the kiosk. The spectator was now active on the computer. The previously distant spectator was now next to him and very interested.

This was characteristic of this day. It was something new. People popped in all the time and looked at the computer. They were not sure what to do with it, or what the purpose of it was. They looked at it, looked behind it and sometimes touched it. The kiosk was empty after 19h00.

2003-12-07

The kiosk remained empty until 17h00 when a lone teenager started to press some keys. He got a picture of something. An adult and another teenager joined sometime later. They only looked on. Later on, music started to play. The teenagers remained until 20h00. No children visited the kiosk.

2003-12-08

This was the first day that women entered keystrokes on the computer. Up to now it were only boys and men. She entered and the security guard showed her something.

2003-12-09

Traffic to the kiosk was pitching up. A boy aged about eight was in front of the computer for a long time. He was alone for most of the time, but other children entered from time to time. Some women also used the computer on this day. The word had not yet spread about the new "thing" in the kiosk.

2003-12-10

At midday, a group of teenagers and one child entered. The one teenager knew how to use a computer and started to play a game while the others watched. They stayed for nearly three hours. Different children and teenagers popped in all the time. They talked a bit but were not very excited about the computer.

In the morning, teenagers would look in, try something and go away. During the afternoon, more teenagers showed up. One of the teenagers usually knew how to operate the computer, while the others were spectators. Few young children visited the kiosk. A lot of them entered, looked at the computer and left. During this initial period, the security guards were often helping people in the kiosk.

2003-12-12

Early in the morning, two young boys entered the kiosk. They tried to do something but left very soon. Adults would come in and do something on the computer. They did not stay long. Few people visited the kiosk during this first week.

The Second Week: 2003-12-13 – 2003-12-19

2003-12-13

At 11h00 a young woman entered. She started pressing keys on the computer. No one joined her, but she clearly knew what she was doing. A bit later, another woman joined her. They worked together on the machine. A teenage boy entered and they chatted, but not about the computer. The people using the computer stayed longer and groups were larger. The visitors were mostly people who knew how to operate a computer, or a passer-by looking in.

2003-12-14

As early as 08h00 three young children were in the kiosk. Two of them started fighting while the third tried to stop them. They left after eight minutes. A young boy entered. He had to stand on the stool to see the screen. He did not touch any keys. A few adults and a teenager also walked in watched and left again. Later a teenage boy and girl entered. He pressed keys on the computer while she watched. After they had left, five young children entered with the security guard. He showed them a few things while they bunched together around the computer. After a while, two other kids joined them. The child in front of the computer got something to work and they became quite excited. Music started playing, which indicated that they were playing some game. Two of the spectator boys started to punch each other playfully. They had stumbled on a site where music played, but it was obviously not a game's music. When they left, the music was still playing. This continued until late in the night. A few people entered, but they did not (or could not) stop this music.

2003-12-15

The music played the whole day, which meant that no one was able to load another program. This was again a more quite day. Few people walked into the kiosk.

2003-12-16

Young adults arrived shortly after 08h00. One of them used the computer while the others watched. At 13h00 a young child and a teenager entered. The teenager pressed the keys while the child looked on. They were very excited. Later on two people entered, but they sat down and chatted. They were not interested in the computer at all.

2003-12-17

During this day, the traffic in the kiosk increased dramatically. Three people looked in shortly after 07h00, probably on their way to work. After 10h00 three teenagers entered. One started pressing keys while the

other two watched. A bit later, two other teenagers joined them. They were very interested in the computer and its use. They stayed for more than four hours.

2003-12-18

At 10h00 a boy and a girl entered. He played a game while she looked interestedly at what he was doing. The boy helped the girl once to do something. When they left, a few adults entered. They did not know how to use the computer and left again. The same teenage group from the day before arrived again. Two adult women also entered as spectators. When the teenagers left, one of the women used the computer. Children younger than thirteen were scarce during these first days. It changed dramatically after this day.

The first busy day in the life of Mamelodi Digital Doorway:

2003-12-19 (The accompanying CD contains videos of this day)

This is the story of this day, starting at 10h00 when traffic started to increase:

10h00

A child (let us name him John) aged about ten, stood on the footstool and looked around, under the computer as well as behind the computer. Then he stood up and pressed keys. Initially he was very unsure of himself, but kept trying. After a while, he stood on the footstool and played a game. MIE was taking place here: John was alone, did not know what to do and found a use for this machine. We will see later that he became the teacher to adults and older children. He left after about fifteen minutes. At this stage, there were three adult men in the kiosk, drinking beer. They were not interested in the computer at all. They might be the reason why John left, but he returned a bit later with other people, which meant that he might have wanted to show others his newly acquired knowledge.

A bit later three adults entered. The adults worked on the computer while John watched, standing back. The adults left and another child entered. At this stage, John was in front of the computer again. The other boy, about the same age as John, was very interested and leaned over the computer while looking. After a while, he went to the left hand side and stood with John on the stool. A teenage boy entered, but only watched from a distance. Then the spectators left while John stayed in front, pressing keys. While busy people would come in, looked what he was doing and left again.

11h00

His friend returned after a while and stood closely by to watch. The music indicated that they were playing a game. They left at about 11h15. Then three adults, John and another kid entered. One of the adults worked on the computer, the others watched. John was very close to the screen and very interested, maybe helping. When they left, John remained behind. A teenager of about 15 entered. John stood on the footstool. He was obviously the leader because he knew what to do. They discussed intensely what he was doing. After a while, the older boy started to press keys. Peer learning was taking place with John being the teacher! (This can be seen at 11h34 on the video).

13h00

This was another group, consisting of three children and one young adult. They flocked together in front of the computer, very uninterested. It was again one of the children taking the lead, but one of the others was clearly pressing keys as well. The children were very close to each other, while the adult was a bit further away. He stood behind them and watched. Ten minutes later, they were a group of eight in front of the computer. Five of them pressed against one another for a better view. The other three were a bit further

away, but still very interested in what was going on. Most of these children were young, only two were teenagers. After a while, some of them left and one of the teenagers took over. There were now only five, all flocking together in front of the computer. They were also taking turns in front of it.

14h00

The same group was still in the kiosk, very interested. One pressed a finger against the screen, indicating something. A sixth child joined the group. They talked to one another, but the tones were friendly. They were very excited about what was going on. It was mostly the smaller children using the computer with the older ones watching. I shall call one of the teenagers Peter. At a certain stage, one of the teenagers, not Peter, took control and started punching keys, with the smaller ones as spectators. Some of them left.

15h00

The same group was still there, now made up of two teenagers (one of them was peter) and four younger ones. Although there is actually very little space between the wall and the computer, two of the smaller kids stood there. Peter was on the other side. This was the only place where they could see and the squashed against the wall. Two minutes later, the older user left, giving control to the younger ones. They immediately started arguing, but it was sorted out very quickly. They were using a program where they pressed the keys very hard. (Hopefully the keyboard can withstand such practice). At this stage, they were shouting in a friendly way and clearly enjoying themselves. There were four children around the computer with Peter a little away. A bit later Peter became more involved and two of the children had to give way. They were still shouting. Then Peter took over. It was the first time that he was in front, although he was much bigger than the children were. He had clearly seen and learned enough, by just watching, to become the user. The previous young user had to help at times. Two of the younger children started crying and called the security guard. He entered and ordered them around. At his stage, it seemed to be a joke – all the children laughed and knocked each other around. The guard left again and it became quieter. Later on other children tried to use the computer and it was now Peter telling them what to do. It is amazing to see how they took turns in quite a friendly manner.

16h00

The group was still there. Another teenager joined them and one of the smaller kids left. They were so closely in front of the computer that three of them stood on the stool. Peter was clearly the leader at this stage. The one smaller kid got bored, but did not want to give up his place. Therefore, he stretched and yawned, but he kept his foot on the stool. Peter left at 16h30. Now the smaller children took control. They were all shouting to each other what to do.

17h00

Only one boy remained, but he left soon after. The place was quite again. During this hour, adults peeped in, but did not stay long. Some children also made an appearance, but did not stay. At the end of this hour, the screen saver came on, showing that the computer had not been used for some time.

18h00

Only one boy was there, but he also left. Papers and rubbish filled the floor. It may be a good idea to put a bin in the kiosk. Two teenage boys entered after about twenty minutes. They clearly knew what they were doing. They had worked on a computer previously. They stayed for fifteen minutes.

After19h00, the computer was visited once. Later on, no one visited the kiosk.

The Third Week: 2003-12-20 – 2003-12-26

2003-12-20

Two young children arrived early in the morning. One of them used the computer. The security guard also popped in, but only looked. The one boy worked on the computer while the other one watched. His attention varied from time to time. He was a friend, but not very interested in the computer. Both of them stood on the stool. After about an hour, the first boy left. Alone, the other boy immediately pressed some keys. Either he was computer literate, or he had learned enough by watching the other one. At a certain stage, he asked the security guard for help. The boy got bored and left. The security guard and two other adults stayed in front of the computer. An hour later, the same two boys returned. They were now working together on the computer. Both were more interested. A third boy arrived and they explained to him what they were doing. He was a bit older than the other two, but the one who knew least.

2003-12-21

The day started with one lone adult working. A bit later two children joined him. When he left, they started pressing keys on the computer. They were very close together and very interested. Then one of them left, leaving the other one alone. This was a rare sight –usually adults were alone in the kiosk. Children were usually in groups. A little bit later, another child did join him and he showed the newcomer what he was doing. The two children left at 11h30, but returned at noon. They got some music playing (not a game) and were very pleased with themselves when the security guard looked in. When they left the music was quiet, but then the security guard entered and got it playing again. A bit later a lone teenager was in front of the computer. Two others joined and they worked quietly there. The children are generally much more excited and noisy than the teenagers and the adults. Two of the teenagers spent a long time in front of the computer, taking turns, probably playing a game. For some reason no one visited the kiosk after they had left at about 15h00.

2003-12-22

At about 11h00 the first visitor appeared – one of the boys who had been there the day before. He got a different visitor every now and then, but no one stayed. After he left, a teenager started pressing keys. Some music played again – not a game. This brought three more adults to the kiosk. The teenager stood back to let them face the computer. They left a bit later and the teenager regained control. A child entered and watched him at the computer. More teenagers also entered. When all of them left, two little boys entered. They were not sure what to do and watched the screen. The music was still playing. A bigger boy entered, moved the two little ones to the side, and showed them something. They left when the music stopped. Two other teenagers entered and played a game. A bit later, a large group joined them, but they left again after a while. Then others entered, enlarging the group to four or five. Two of them actively worked on the computer, while the others stood at some distance to watch. The teenagers were more reserved. In the afternoon, a large group of children and teenagers flocked in front of the computer. With this variety of people, it was interesting to see that children were sometimes the active ones often teaching the others. The kiosk was very untidy.

2003-12-23

Again, a mixed group was in the kiosk. This time the adult was working while the others watched. Children sometimes got bored and moved away, something that happened seldom when they were only a group of children. The group of children even sat down on the floor and played some game. However, when the adult left, a group of four teenagers entered and took over. They could not see what happened on the screen. Some time later only two of the teenagers were left and the children got a chance again. More young adults entered, but it was the children running the show. They got some jazz music playing. The

group steadily grew. This picture shows the mixed group with children in control. A bit later, some of the teenagers left. One of the children, who could not see the screen, got a bucket somewhere and stood on it to see the screen. As usual, the children flocked together in front of the computer and it was sometimes difficult to see who the user was. They were playing some game and again the sound attracted others. The kiosk was still very untidy with the floor strewn with papers.

2003-12-24

Two young teenagers were in front of the computer, playing together. They stood relaxed with one foot on the stool. While the one was pressing keys, the other one showed something on the screen. A bit later more teenagers and a few adults joined them. One of the adults took over. These older group did not press so closely together as the younger ones. They were still very interested, but quieter. The one child could not see the screen, so he left. Some time later it was only two teenagers, not the same as previously, who were in the kiosk.. They were not doing anything, but watched the screen intently. A bit later they started pressing keys. This became a typical event: people looking at the screen for a while, and then later on pressing keys. More children arrived, all watching the screen. One of the children started pressing keys while the others looked on. One of the teenagers left, and it was the child showing he teenager what to do. A bit later more people were in the kiosk. The children were standing in front and the adults in the back. Two of the children were playing on opposite sides of the computer. A bit later it was an adult working while the children watched. They would not interfere when an adult was working, but they were interested. Then he got stuck and two children showed him what to do.

At 1300 two of the teenagers were left. They were soon joined by others. But all of them except one left again. He was playing a game. A bit later a child walked in. Two girls also popped in. They were not part of the group. The one girl was standing against the wall while the other walked around, trying to see something on the screen.

Later during the afternoon three young adults were in front of the computer, leaning and playing together. When they left, the two girls got a chance. They were about ten yaers of age, and stood on the stool. It seemed as if both of them were playing together. Some teenage boys entered and the girls had to relinquish their positions. They left after a while. The boys flocked together in front of the computer. Five of them, one a little boy, were close together in front of the computer, while another one stood a bit away and watch. Then the teenagers left and four children took over. At this stage different children entered the kiosk while others left. The two girls appeared again. One of them knew more than the others. The others watched closely. When more boys arrived, the girls left again. One of the children were very young, about five. He stood on the stool watchin what happened. Another young boy was swinging around the computer.

On this day there was seldom a time during the day that the computer was not fully occupied. The groups varied from adults to young children, but it was more frequently children. Their groups were generally larger than the others. The girls only got a chance when others left, or when the children were younger. An older girl (teenager) arrived at some time, and she was in front of the computer with the younger boys. She was, however, only a spectator. When some of the boys left, two of the others showed her what to do and she tried it. At a certain stage the boys were jumping up and down on the computer. It is, fortuanately, child proof. When this group left, three younger ones arrived and played together.

On Christmas day the video started at 10h00 with three teenagers in front of the computer. The one was actively pressing keys, while the other two watched. They were close together and the two spectators were very interested and pointing to the screen at times. One of them left and then the other two took turns in pressing the keys. A girl entered to have a look at what was going on. She stood at some distance. A bit later two children entered, jostling to get a view of the screen. The one was very young and got in between the two teenagers. After a while all the children left again, leaving the three teenagers. They were now very close together and evidently working together on the computer. An older teenager and an adult joined them, but they only watched. Two other children entered the kiosk and tried to get a view of the screen. They left after a while and the same three teenagers and a more distant adult remained behind. Two smaller boys entered and stood close by. All of them were now watching the screen. Another child, still very young, entered and got on the stool. They were watching and pointing at the screen. At this stage no one was pressing any keys. Two of the teenagers left at about 15h30 after spending nearly the whole day in the kiosk.

At 16h00 two children were in the kiosk. They were not sure what to do untill a teenager entered and started to press keys. This was, up to now, one of the few moments when a teenager taught children what to do. The teenager stood back and one of the children took over. Every now and then he helped them with the computer. When he left, the one child was active in front of the screen. He had learned how to do something on the computer. Then the other boy came closer and it was his turn to learn some computer skills. One of the teenagers who had been there nearly the whole day returned and took over. The others then left.

2003-12-26

On this day the video started at 10h00 with the same three teenagers of the previous day, in front of the computer. All three were involved and they played together on the computer. Some children and some adults looked in, but did not stay. A small child entered and stood looking at the screen, but he did not get a chance. The one teenager left after an hour. The child returned together with a few adults. He stood in front right next to the computer, climbing on and off the stool all the time. He was very interested. When the earlier teenagers returned, he had to stand back again. He left after a while and another child arrived. He stood on the stool. The children were now shouting at one another, but in a friendly way. The small child entered the kiosk again. He was still left in the back and had to struggle to see anything. The boys were very close together and it was difficult to see who was actually working on the computer.

At 13h00 the kiosk was filled with children struggling to get a view of the screen. They were huddled in front of the computer. At this stage the ones in the back were the ones least interested, or maybe the ones who did have any computer knowledge. The smaller children were more to the front of the group. Different children entered, watched for a while and left again. But for most of the time the group in front of the computer consisted of about eight people. Music was playing, but not that of a game. One of the teenage boys was pressing keys while the others passively watched. Some of the kids got buckets somewhere which they used as stools to get a better view of the screen. Sometimes one would get tired and sit down next to the wall, but would not leave. One of the small children was in front of the computer taking control. The group sometimes grew to ten children. It was never a static group. They were moving all the time, maybe due to the music playing. Security guards entered and the children made way for them.

The Fourth Week: 2003-12-27 – 2004-01-02

2003-12-27

A group of teenagers was in front of the computer. One was working on it while the others watched. They were quiet and concentrating on the screen. Then the one, who was working, gave way to one of the others, but he watched intently what the other one was doing. More teenagers joined them, and they shrieked all the time. There were no younger children with them. This group stayed for a long time. At one stage, someone brought a bucket and the child in front of the computer sat down on it. They gave different teenagers a chance to do something.

At about noon a few children joined the group. Music was playing at this stage. Younger children were in the back of the group and not getting a chance in front of it. One of them squeezed in between the computer and the wall to get a better view. At 13h00 the children left again, leaving the teenagers in front of the computer.

At 17h00 the group left and a child was left alone. He immediately started to press the keys. An adult entered and watched him. He left again when a teenager entered to look. More teenagers arrived, and the child gave way to them. He left. The group grew quite large, but consisted only of teenagers.

2003-12-28

The scene opened with an empty kiosk strewn with papers. The bucket used as chair the previous day was still there. After twenty minutes, a single child entered and pressed keys on the computer. He did not stay long. Just before 11h00 a group of four children entered. They were quite noisy and two of them pointed out objects on the screen. One boy sat down on the bucket. They did not really press keys on the computer, but talked excitedly about it. A little later, a few teenagers entered and the group of children immediately left. This teenage group was much noisier. They flocked together in front of the computer and were very interested in the screen. They left soon after. Four very small children entered. All four got onto the footstool and they discussed the computer. Then they left as well. They returned a bit later with one of the older children. They definitely wanted him to show them something. He could not, left, and they got a teenager who knew what to do. However, very soon, the kiosk again filled with teenagers and the children left. The groups did not stay very long on this day. When these ones left, a lone teenager entered and pressed keys. He left again. In all this time, the screen did not change once.

At noon, there were four teenagers in the kiosk. One was playing while the other three watched. A little later, more people entered – some adults as well. They suddenly got some music playing. It sounded as if they got a game working. These people left at 12h30 and the kiosk were empty for more then an hour. Only single people entered. This was, strangely enough, a very quiet day in the kiosk. There was sometimes a group, but more often a single child in front of the screen. At a certain stage, two boys were there, but they obviously were not able to get anything to work. The pressed the keys simultaneously.

2003-12-29

A group of children together with two adults was in front of the computer. One of the adults was pressing keys while the children watched. They left soon after, and for the rest of the hour the kiosk was empty. After 11h00 two young teenagers entered. When they left, the kiosk was again empty for a long time. It was very strange that the kiosk was empty so often after it had been so crowded previously. Groups of people would come in, stay for a few minutes and leave again. For most of the time there was no one in the kiosk.

For most of the time, there were never more than two people in front of the computer. They seldom stayed for more than five minutes.

2003-12-31

This was the last day of 2003. The tendency seemed to be the same as the day before. One, or at the most two, children or teenagers entered, pressed a few keys and left again. Sometimes there were people in the kiosk not interested in the computer at all. At a certain stage, a woman was sitting on the stool, waiting or resting. She left and the pattern repeated itself. By 17h00 the kiosk was empty.

2004-01-01

New Year. By 12h00 two lone teenagers briefly entered the kiosk. Both of them left soon after they had entered. This pattern continued for the rest of the day, except that once only there was two small children together who left again. The kiosk was almost solitary the whole day.

2004-01-02

A child arrived at about 10h30. He stayed for a while. Another entered. He looked behind the computer and looked what the other one was doing. After a while, the group grew to four children. It was raining outside – most of them held an umbrella. They left again soon after. At 13h00 a boy entered. He pressed keys on the computer, but it did not work and he looked behind the computer. Then a group of three entered, but nothing worked for them and they left. After 14h00 three girls entered. They stood in front of the computer and pressed the keys while discussing it. They stayed longer than the rest, but also less than ten minutes. This was the pattern for the day. Children would come in, press some keys and look behind the computer, and leave.

The Fifth Week: 2004-01-03 – 2004-01-09

2003-01-03

The kiosk was empty the whole day except for the odd visit by single individuals. The screen stayed the same as the previous day.

2003-01-04

A similar pattern occurred as the day before.

2003-01-05

The screen was not on the same program any more. A boy was in front of it and definitely working on it. Some adults entered and he left. When they left after a while, the boy returned. He was alone for most of the time, until some teenagers entered and took over.

At noon, a boy was alone in front of the screen. A bit later, three other boys joined him. They were playing in front of the computer, hopping on and off the stool. About ten minutes later three teenagers arrived. They took over immediately and the children left. When the teenagers left, another boy started paying. A few adults who were only spectators joined him. Then the children left and the young adults worked on the computer. One of them pressed the keys and the others watched. They got bored and left, leaving him alone. He stayed for a long time. Children entered and watched what he was doing.

The day started with five children in front of the computer. Two were at a distance but the other three pushed against each other to see the screen. After a while, some adults entered and watched what was going on. Then teenagers entered and took over and the children left. At this stage, there were three teenagers and one child in the kiosk. Two of the teenagers worked together and the others watched. The child was not part of this group.

When they left, two women entered and looked at the screen, and a family consisting of a father, mother and small child. However, they were very briefly in the kiosk. After they left, the kiosk was empty for about half an hour. Then a teenager entered and worked alone on the computer. Two other teenagers and two very small children joined him a bit later. These two could not see the screen and tried to see; they hanged on the computer to get a sight of the screen. The user left and the other two teenagers took over. There was still one child left. The group steadily grew larger. Most of the time there were five to six children in the kiosk. This stayed the same for most of the day – young teenagers in front of the screen while a few children tried to see the screen by climbing on the stool or hanging on the computer.

During the afternoon two children entered. They played together on the computer. One was a small and the other a bit taller, but both stood on the stool. One was clearly the leader, but the other took part in pressing of keys. These two were alone for more than an hour, when teenagers entered and took over again.

2003-01-07

Early on this day the same two children as the previous day were in front of the screen. One adult was watching. They took turns in using the computer. Then they started fighting, pushing each other and trying to get control of the keyboard. A bit later, another child entered and the children calmed down. The three of them stood together on the stool, with the taller boy in the centre. After a while, the taller boy left, leaving the other two alone. An adult entered, but he was only a spectator. After a while, he had learned what to do, and they gave him a chance in front of the computer. This was not a "takeover" that usually happened with the teenagers. The children showed him what to do and helped him. The three stayed for more than an hour, working together. When they left, two younger teenagers entered and played on the computer. In this case, the one was pressing the keys and the other one watched for about half an hour, then he tried to press the keys.

During the afternoon, the kiosk teenagers filled the kiosk. They gathered in front of the screen. Only one teenage boy was left a bit later. He stayed for more than an hour. When he left a group of children entered and pushed together in front of the screen. All of them had been there earlier that day or the previous day.

2003-01-08

Four teenagers were in the kiosk. They were very interested in the computer's screen. A child sat on the floor against the wall. A cleaner entered and they left the kiosk. After he had left, two boys arrived and started to play a game. They had been there several times before. Single adults looked in at different times, but the boys continued to play. The group grew and shrunk, with even a few girls sometimes. The girls never touched the computer. After a while, one boy was alone and he was very interested in his game.

An adult and a few children entered. The children showed the adult what to do. He lost interest and left, leaving a group of children behind. At this stage, it was the smallest boy in front of the keyboard. One of the others looked behind and under the computer. Another adult arrived and the children taught him what to do.

They left and a single boy stayed alone for nearly half an hour. After they had left, the kiosk was empty for some periods, with small groups of children present at times.

2003-01-09

The same two children of the previous days joined the young teenager. The group changed gradually, but most of the participants were regular customers.

Later on children were showing an adult what to do.

At noon a woman and a girl were in front of the computer. A security guard was helping them. The woman was modern and smartly dressed. A boy joined them. It was the woman working on the computer. After a while, the woman left, leaving the two children alone. The security guard also left. They were soon joined by other children, one of them a girl. The boy showed the girls what to do and the one girl got a chance in front of the keyboard. At a certain stage a teenaged boy entered, but he worked together with the rest. The girls left. During the afternoon the kiosk was empty except for two adults who used the computer at different times.

The Sixth Week: 2004-01-10 – 2004-01- 17

2003-01-10

A few children were in the kiosk for a short while. One adult male and female entered and he did some work on the computer. A boy entered the kiosk. He was alone for a while and did not know what to do. Then another older boy entered and showed him what to do. Two other small boys soon joined them. The children were the spectators while the teenager did the work. The teenager left after a while and the children tried to play a game. Another teenager entered and took over while the children watched. One of them got very bored and sat down on the floor against the wall. The group grew to eight children in the kiosk. The ones in the front were very interested in the screen, but a few stood a bit back and watched from a distance. These children left after a while. The group remaining got very excited about something. When they left, a single boy entered who used the computer as a climbing device.

For the rest of the day the kiosk stayed empty with the screen saver on.

2003-01-11

An adult entered and did some work on the computer. He left shortly after and then a very young boy entered. He played a game and a bit later, more boys joined him. A few adults also entered and watched what was going on. It was a large group and the boys were shouting at each other, but in a friendly way. The children stayed in front of the computer even when some teenagers entered. They were very excited and screamed to each other about what was going on. The group stayed large and some of them were playing with each other. After 15h00 some of them left and only two remained behind. Then one of them left as well, leaving only one child in front of the screen.

2003-01-12

A few children were in the kiosk. Teenagers entered and they took over. After they left, a very small boy could be seen in front of the screen. He could almost not see the screen when standing on the stool. Others entered and he left the kiosk, but he returned a while later.

Three teenagers worked on the computer while a few children played with each other in the kiosk. The small boy returned a few times. He was together with a girl a bit older. It seemed as if she was watching over him.

They quarreled at a certain stage and he started crying.

In the afternoon, the kiosk was empty for a while. Then two teenagers entered and played together on the computer. The security guard entered and showed them a few things. Later on the kiosk was empty for a while, after which some teenagers filled it again.

2003-01-13

A lone adult was in front of the screen. He knew what to do and was joined after a while by another one. They stayed for a long time and no children entered during this time. Another adult entered and the first one left. They worked together on the computer for more than an hour. When they left another one entered and sat down on the stool, resting. He was not interested in the computer at all. After he left, only a few sporadic people entered for the rest of the day.

2003-01-14

One adult was in the kiosk. He left after a while and a teenager entered. He stood on the stool and watched the screen intensively. Then he looked behind the computer. Two others entered, but none of them knew what to do with the computer.

They left and two other teenagers entered. The one showed the other how to operate the machine. They pressed keys on the keyboard. During the afternoon a few teenagers entered and pressed keys on the computer, but no children were there.

2003-01-15

Adults filled the kiosk. They watched the screen to see what the person in front of it was doing. They were much quieter than the usual group of children. During the afternoon, a few teenagers entered. They stayed for a longer a time. At a certain stage, the security guard entered and helped them. They left and three other entered after the kiosk was empty for a while. They clearly knew what they were doing.

2003-01-17

This was the first Saturday after the school opened and the kiosk was filled again with children and teenagers for most of the day. It could be seen on the video that the Digital Doorway project is a huge success.